THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Apart from some railroad contracts which have emphasized anew the sustaining influences exerted from that source in the past six months, the iron market has had an inactive week. In the prolonged absence of general buying, stress may be put either on sustained consumption at an unparalleled rate, or upon the fact that in some lines sellers are more anxious to do business than buyers. Both these features are important at the present stage, but the latter is the one of most immediate interest, since prices on business now on the books are well known, while the basis on which new business will be taken is not. That pig iron production is at a rate which in the immediate future will cause some accumulation of stocks, is the view taken by those who emphasize the stocking up movement of recent months in some finished material lines in which stocks in second hands and in ultimate consumers' hands were at low point throughout 1904. The extent to which pig iron under contract for delivery in the first half of this year will lap over actual consumptive needs prior to July 1 is also a factor. Deliveries are being taken in full, with few exceptions, yet buyers are quite indisposed to make new contracts.

The most important development in pig iron this week is the reduction to $13 for No. 2 foundry iron, Birmingham, by one large Southern interest. What could be done by buyers of a round lot is yet to be determined. The absence of buying under such conditions is not a new experience in the iron market; and a simultaneous attempt of a large number of buyers to cover at a presumably low point would not be new.

It is now announced that the Steel Corporation will not buy Bessemer iron for May delivery; it is also stated that all April iron has now been delivered. The large active capacity of Corporation blast furnaces (96 percent) on May 1 and the full operation of Bessemer Pig Iron Association furnaces on the same date indicates another remarkable record in steel-making pig iron in April. A 30,000-ton purchase of Bessemer iron by a Western Pennsylvania steel company is reported, deliveries over three months. Some accumulation of Bessemer iron at furnaces is now to be expected, but manufacturers are holding for $15.50 meantime.

Additional rail orders for 33,500 tons placed by the Pennsylvania Railroad Co. in the past week bring its total for 1905 up to 136,000 tons. The Boston & Maine has taken 12,000 tons in addition to its original order; a Pacific Coast road ordered 6,000 tons and a Southern road 5,000 tons. An Ohio and a New York trolley road took 3,000 tons each. There are also announced contracts for 10,000 cars by the B. & O. Railroad Co., 6,000 to be of all-steel construction and 4,000 to have steel underframes. Pittsburg plate mills, with this additional tonnage, now have their capacity engaged well toward the end of the year. With each week steel construction looms up in a way that promises to make 1905 a record year in building. The American Bridge Co. alone booked 12,000 tons the past week and a total of 40,000 tons is pending, while in addition 80,000 tons will be required for the new Manhattan bridge, for which specifications go out June 1. The well distributed activity in building lines is expected later to add to the demand for wire, sheets, tin plate and merchant pipe.

Agricultural machinery and implement works have new contracts for bars under consideration, but little has been done as yet.

Independent wire manufacturers are scheduled to meet in Chicago this week to consider the advisability of an advance in prices.

Cast iron pipe works, all of which are running practically to capacity, took some good orders the past week, including 13,000 to 14,000 tons for New Orleans.

The new rail mill at Youngstown, O., is not counted on as a factor in rail business this year, and it is understood no apportionment of association tonnage has been made to it.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
427 PARK BUILDING, May 9.

Large purchases by railroads have been the important factor in the week's iron and steel trade. The Pennsylvania Railroad placed an order for an additional 33,500 tons of rails for delivery this year, making a total of 136,000 tons for this system for 1905 delivery. The Baltimore & Ohio Railroad contracted for 10,000 cars, of which 6,000 will be of steel construction, and the remainder will be of wood with steel under-frames. Approximately 70,000 tons of plates and 10,000 tons of shapes will be required in the construction of these cars, while the castings and other iron and steel accessories will almost equal the total tonnage of plates and shapes. The plates required will be delivered practically through the remainder of the year, and this order, added to the plate requirements of the steel car works already on the books of the plate mills, insures steady operation for the latter through the remainder of the year. All of the structural mills are already from two to three months behind on their deliveries of light steel car shapes, and the additional tonnage required on this order will further crowd the mills.

It was definitely announced this week that the United States Steel Corporation would not purchase Bessemer iron from the merchant furnaces for May delivery. All of the April iron has now been delivered. Whether the Corporation's failure to purchase outside iron will result in lower prices for Bessemer is causing considerable speculation, but every effort will be made to maintain $15.50 even if iron is stocked in furnace yards. The Cambria Steel Co. purchased 30,000 tons of Bessemer from a merchant furnace interest outside of the Bessemer Furnace Association for May, June and July delivery. It is reported that the price was $15.50, at furnace, but it is generally believed this was guaranteed against decline. Sales of Bessemer have been made at $15.25 for early delivery, and it is doubtful if a lower price can be secured for small lots. The foundry and forge iron markets continue ex-

tremely quiet, and furnaces are inclined to give concessions for future requirements. While $15.75 is the minimum on No. 2 for early delivery, this price could be shaded for delivery through the third quarter.

In finished lines the market shows practically no change from conditions prevailing a week ago. The movement of wire products has improved slightly. On sheets the average sales are being made on the basis of 2.35c for 28 gauge, while larger tonnages might be placed at 2.30c. Few new orders are taken for tin plate. Leading agricultural implement manufacturers are already sending out inquiries for their merchant bar requirements for the year beginning July, but as yet no contracts of importance have been placed. A few of the large consumers believe that they should be given slight concessions on their purchases, but the steel bar association has as yet called no meeting of manufacturers to consider a price to cover this tonnage, and it is doubtful if any reduction from prevailing prices will be made.

The tonnage of structural shapes that will be required this year in the erection of buildings promises to pass all records. In fact, this tonnage promises to be much greater than the requirements of the railroads. As soon as this building movement is well under way an improvement in wire products, merchant pipe and sheets is anticipated, the building trade having been as yet a comparatively small factor in the consumption of these lines.

Pig Iron.—While the trade expects lower prices on Bessemer iron as the result of the failure of the Steel Corporation purchase, an effort will be made by the Bessemer Furnace Association to maintain $15.50 at furnace. A meeting of the association was held in Cleveland on Saturday. The report that the sale of 30,000 tons of Bessemer to a western Pennsylvania steel company for delivery in the next three months had been made at $15.50 occasioned some surprise, especially in view of the fact that there have been sales of small lots as low as $15.25. Basic iron today is relatively stronger than Bessemer, but consumers are disinclined to cover for third and fourth quarter requirements at present. Foundries are only buying to meet immediate requirements, and small lots of No. 2 foundry are being sold at $15.75, furnace. This price could no doubt be shaded on a large tonnage for forward delivery. During the month of April 92 percent of the blast furnace capacity tributary to the Lake Superior region was active, and on May 1 the United States Steel Corporation had 90 percent of its furnace capacity in operation, while the Bessemer Furnace Association and the Republic Iron & Steel Co. were operating 100 percent of their capacity. We continue quotations as follows:

Bessemer, Valley	$15 25 to 15 50
Bessemer, Pittsburg	16 10 to 16 35
No. 1 Foundry	17 25 to 17 50
No. 2 Foundry	16 60 to 16 85
Gray Forge, Pittsburg	15 60 to 15 75
Basic, Valley	15 35 to 15 50
Basic, Pittsburg	16 10 to 16 35

Steel.—Sheet bars for early delivery are now offered at $25.50 to $26, Pittsburg, and for delivery after July 1, $25 can be done. On Bessemer billets the mills are quoting $23 to $23.50, Pittsburg, while open-hearth are held practically on a parity with sheet bars. We note the sale of 1,000 tons of open-hearth billets made by an Eastern mill for delivery in the East at $25.60, delivered. Bessemer and open-hearth rods are quoted $34 to $35.

Ferro-Manganese.—The market is quiet and carload lots are quoted at $51 to $52, only foreign material now being offered.

Muck Bar.—Muck bar is easier, and neutral bars are offered at $27.85, Pittsburg.

Skelp.—Consumption of skelp continues heavy and the mills are holding grooved steel at 1.60c and sheared at 1.65c. Grooved iron is quoted at 1.70c and sheared at 1.80c to 1.85c.

Rails and Track Material.—The Pennsylvania Railroad has placed an additional order for 33,000 tons of rails which has been divided as follows: United States Steel Corporation, 20,000 tons; Cambria Steel Co., 7,500 tons; Pennsylvania Steel Co., 7,500 tons. Owing to the lack of steel producing capacity it is doubtful if the Republic Iron & Steel Co. will actively compete in the rail market this year. As yet this company has not been admitted to the rail association and so far as can be ascertained no request has been made for an allotment of tonnage. Light rails are easier and $23 can be done on 25 to 40 pound sections. We make the following quotations: Fifty lb. and over 500 tons, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 16 lb., $27 to $28; 20 lbs., $26 to $26.50; 25 to 45 lbs., $23 to $24; angle bars for standard sections, 1.25c; spikes, 1.75c to 1.80c.

Plates.—Plate requirements of steel car plants grow heavier daily and all of the mills are from three to four months behind on open-hearth material. Demand for tank plate has not improved very materially and the mills can make deliveries on Bessemer in 30 days. Quotations remain unchanged as follows: Tank plates, 1¼ in. thick, 6¼ in. to 14 in., inclusive, 1.50c f. o. b. mill Pittsburg; over 14 in. up to 100 in., 1.60c. Extras are as follows per lb.: Flange and boiler steel, 10c; marine, A. B. M. A., and ordinary fire box, 20c; still bottom, 30c; locomotive firebox, 50c; plates over 100 in. up to 110 in. in width, not less than 5c per lb. extra; plates 110 in. to 115 in. wide, not less than 10c extra; 115 to 120 in., 15c extra; plates 120 in. to 125 in. wide, not less than 25c extra; plates 125 in. to 130 in., not less than 50c extra; plates 130 in. wide, not less than $1 extra; plates 3-16 in. thick, $2 extra; gauges 7 and 8, $3 extra; No. 9, $5 extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all points of delivery in the United States except Pacific Coast.

Bars.—The large agricultural implement manufacturers will soon close contracts for their year's requirements of merchant steel bars. The bar manufacturers declare that these large consumers will not be permitted to close on a lower basis than is now prevailing and they deny that any contracts have been taken up to date at a concession from ruling quotations. On iron bars local mills are quoting 1.65c for local delivery and 1.60c for outside delivery. We quote as follows: Bar iron, 1.60 to 1.65c, Pittsburg; hoops, 1.65c, and bands, 1.50c, both taking bar extras. Bessemer steel bars, 1.50c; open-hearth steel bars, 1.50c; plow and cultivator, 1.50c, net; channels, angles, zees and tees, under 3 in., 1.65. The following differentials are maintained on steel: Less than 2,000 lb. of a size and not less than 1,000 lb., 10 cents advanced; less than 1,000 lb. of a size, 30 cents advanced.

Sheets.—On carload and over the average price for black sheets is 2.35c, although on a large tonnage with desirable specifications it is possible to do 2.30c. All of the mills are now assured a good tonnage until July 1, but the outlook is not so bright after that date. On carloads and over we make the following quotations on black sheets: No. 30, 2.70c to 2.80c; No. 29, 2.60c to 2.70c; No. 28, 2.30c to 2.40c; No. 27, 2.20c to 2.30c; Nos. 25-26, 2.20c to 2.25c; Nos. 23-24, 2.15c to 2.20c; Nos. 18-20, 2.10c to 2.15c; No. 16, 2.10c; Nos. 12-14, 2.05c; No. 9, 2c; No. 8, 1.95c; Galvanized, No. 30, 4.35c; No. 29, 3.85c; No. 28, 3.45c; No. 27, 3.25c; Nos. 25-26, 3.05c; Nos. 23-24, 2.85c; Nos. 18-20, 2.70c; No. 16, 2.55c.

Cotton-Ties.—While the bulk of the tonnage has already been placed, no advance in prices has yet been announced by the manufacturers. Lots of 3,000 bundles and over are quoted at 85c and smaller lots 88c.

Pipe and Tubes.—Prices of merchant pipe continue to be shaded, few of the independent mills quoting the prices

held by the leading interest. Demand for tubing continues very heavy and the mills are gradually falling further behind in their deliveries. Discounts to consumers, carload lots, f. o. b. Pittsburg, plus freight to destination according to Tube Rate Book, are revised as follows:

MERCHANT PIPE.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛ and ¼ inch	67	51	65	49
⅜ to 6 inches	75	65	73½	63½
⅜ and ½ inch	71	59	69	57
7 to 12 inches	70	55	68½	53
Extra Strong Plain Ends.				
⅛ to ¼ inch	60	48	58	46
½ to 4 inches	67	55	65	53
4½ to 8 inches	63	51	61	49
Double extra strong plain ends, ½ to 8 inches	56	45	54	43

MERCHANT BOILER TUBES, CARLOADS, 22 FEET AND UNDER.

	Steel.	Iron.
1 to 1½ inches	44	41
1 ¾ to 2½ inches	56	41
2½ inches	58	46
2¾ to 5 inches	64	53
6 to 13 inches	56	41

Less than carloads 2 points less.

Wire and Wire Nails.—There is a slight improvement in the movement of wire products and improvement in demand is looked for the end of this month. Demand for both cut and wire nails has improved considerably in the past ten days. We quote as follows: Wire nails, jobbers' carload lots, $1.80; retailers carload lots, $1.85, and less than carloads, $1.95; painted barb wire, $1.95 for jobbers in carloads; retailers' carloads, $2, and less than carloads, $2.10, with 30c for galvanizing. Annealed smooth fence wire is held at $1.65, with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o. b. Pittsburg, 60 days, with 2 per cent discount for cash in ten days. Iron cut nails are held at $1.85 Pittsburg, and steel at $1.75.

Merchant Steel.—There has been a slight falling off in the demand for higher grades of crucible material, although the market on cheaper grades continues strong. Some shading of prices has also been reported. We quote: Cold rolled and ground shafting, 50 percent off in carload lots, and 45 off in less than carloads, delivered in base territory; tire steel, 1.65c to 1.75c; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flat, 1.75c to 1.85c; smooth finished machinery steel, 1.80c to 1.85c; toe calk, 2.05c to 2.15c.

Old Material.—The May allotment of scrap disposed of by the B. & O. amounts to about 17,000 tons. The sale of this tonnage has further weakened the market and consumers are waiting. We make the following quotations, gross tons: Heavy melting stock, $15.25 to $15.50; Low phosphorus material, $19 to $20; cast scrap, $14.50 to $15; cast iron borings, $10 to $10.25; bundled sheet scrap, $14 to $14.50; rerolling rails, $16.40 to $16.50.

Structural Material.—Steel for buildings continues in heavy demand and the indications are that the tonnage used for this purpose this year will eclipse all previous records. Quotations are unchanged as follows: Beams and channels up to 15 in., 1.60c; over 15 in., 1.70c; angles, 3x2 up to 6x6, 1.60c; zees, 1.50c; tees, 1.65c; angles from 3 to 16 in., 1.60c; universal and sheared plates 6¼ to 14 in., inclusive, 1.50c; over 14 in., 1.60c base.

Coke.—For early delivery furnace coke is selling at $1.90 to $2, while foundry coke is quoted at $2.60 to $2.75. The foundries are doing little buying and furnaces are not yet covering for the second half. Production continues heavy, the upper Connellsville region having produced 269,378 tons during the week ending April 29, and the lower region 80,902 tons.

CHICAGO.

OFFICE OF *The Iron Trade Review*, }
1164 MONADNOCK BLOCK, May 9. }

Trading has been quiet in the past week partly because of the easier conditions in raw materials and partly because of the inability of mills to give early deliveries on finished material. The market is not a normal one and the real test is still to come. The efforts of pig iron manufacturers and of manufacturers of some finished forms to fill their books at concessions is the strongest indication of weakness in the situation. The inference this haste suggests is not lost sight of in the consumer's mind, and undoubtedly accounts in a large measure for his chariness in making contracts for new material. The fear of lower prices because of over-production grows with each week's continuance of the present condition. Practically every fit iron and steel plant in the country is running to full capacity; and while most of the material now being turned out is under contract, there is still some doubt, because of the lack of official information as to crop prospects, whether the country will consume metal in the last half at the rate of production of the past few months. Until more is known on this point the quietness in metal lines is expected to continue.

Specifications on old contracts show no diminution. On the heavier finished materials, the tonnage in demand is beyond the capacity of mills to supply. Jobbers particularly complain of the delayed shipments of plates and structural steel from mills. Sheets show no gain in strength, jobbers and independent mills giving concessions on light gauges. Bar iron is coming more in line with steel bars, being easily obtained by small buyers at 1.55c Chicago. The inquiry for steel by implement interests for last half delivery has fallen off without resulting in much new tonnage. Tubular goods are active, especially cast iron pipe, for which contracts aggregating 20,000 tons have been placed with the leading interests since our last report. Of interest to the wire trade is the meeting of independent manufacturers which will be held in this city next Thursday to consider, it is stated, an advance in wire nails. It is doubtful if such a move would be sustained, in view of the cutting of prices that has been common for several weeks past among jobbers and the outside producers. Some tonnage in heavy sections has been booked in the past seven days, though it has all gone to Eastern mills. Trading in light rails is retarded in this market by the inability of the Western manufacturer to make deliveries within three to four months from the date of placing order. The scrap market continues soft and quotations are 50 cents lower than a week ago.

Pig Iron.—The continued holding off of Western foundrymen has more clearly defined the weakness of Southern irons. No schedules have been changed, but it is possible to contract on the basis of $13.25 Birmingham for No. 2 foundry for last half requirements. As yet, however, foundrymen have not responded to the offers of furnaces, and little if any tonnage has been booked in the week under review for these deliveries. Not in months have so few transactions been closed up in one week. This market is absolutely without life. The belief that there will be a further drop in prices because of the high rate of production is largely responsible for the light trading. Interest in the market is keen, however, and an active buying movement is anticipated as soon as the atmosphere clears up. Northern irons are sharing in the quietness prevailing, but are without change as to price. We quote as follows:

Lake Superior charcoal	$18 00 to 18 50
Northern Foundry No. 1	17 75 to 18 00
Northern Foundry No. 2	17 25 to 17 50
Northern Foundry No. 3	16 75 to 17 00
Northern Scotch Foundry	17 75 to 18 00
Ohio Strong Softeners No. 1	19 30 to 19 80
Ohio Strong Softeners No. 2	18 30 to 18 80
Southern Foundry No. 1	17 40 to 17 65
Southern Foundry No. 2	16 90 to 17 15
Southern Foundry No. 3	16 40 to 16 65
Southern Foundry No. 4	16 15 to 16 40
Southern No. 1 Soft	17 40 to 17 65
Southern No. 2 Soft	16 90 to 17 15
Southern Gray Forge	16 15 to 16 40
Southern Mottled	16 15 to 16 40
Southern Silveries (4% to 6% Silicon)	18 65 to 19 15
Jackson Co. Silveries (6% to 8% Silicon)	21 30 to 22 30
Jackson Co. Silveries (8% to 10% Silicon)	22 30 to 23 30
Alabama and Georgia Car Wheel	20 90 to 21 15
Malleable Bessemer	17 50
Basic Iron	17 15 to 17 65

Billets.—Small lots of forging billets are now quoted $30 a ton in this market, and several small lots have been sold at this price within the past few days. There is no demand for other kinds of billets, because of the known inability of mills to fill such orders. Wire rods are strong, and are quoted $34 Pittsburg for Bessemer rods and $35 Pittsburg for chain rods. Sheet bars have been offered at $29.50 Chicago, but without any takers. Bessemer or open hearth rolling billets are quoted at $28 Chicago.

Bars.—Little change is to be noted in the local situation. Bar iron continues weak, trading being extremely quiet. While the market is nominally 1.55c Chicago, this would be shaded on a desirable order. The inquiry for steel shapes from the implement interests for last half delivery has fallen off and is scarcely perceptible now. Little new tonnage was added to the books of mills as a result of it, and the belief is that most of the inquiries were sent out merely to sound the market. The local harvester interest continues to sell such sizes as it can roll, below established prices. Specifications against old contracts are on the increase, and tax the capacity of mills to the utmost to fill. Prices are without change and we quote carload lots, mill shipments, Chicago delivery, as follows: Bessemer and open-hearth bars and bands, 1.66½c base, half extras; soft steel angles, less than 3 x 3, 1.76½c; hoops, 1.81½c base, full extras. Store trade is active and prices are firm. We quote bar iron, 1.90c base, full extras; soft steel bars and bands, 1.85c to 1.95c base, full extras; soft steel angles, channels and tees, under 3 in., 1.95c to 2.05c; hoops, 2.20c base, full extras.

Sheets.—The weakness in sheets is still apparent. Jobbers and independent makers are shading their prices to invite tonnage on gauges for which the demand has been light. These cuts vary according to the desirability of the order under consideration. They are more frequently made on box annealed than on blue annealed sheets, however. With the above reservation, we quote "official" prices on carload lots, mill shipments, Chicago delivery, as follows: Blue annealed sheets, Nos. 9 and 10, 1.86½c to 1.91½c; Nos. 11 and 12, 1.91½c to 1.96c; Nos. 13 and 14, 1.96½c to 2.01½c; Nos. 15 and 16, 2.06½c to 2.11½c. On box annealed, one pass cold rolled, we quote Nos. 18 and 20, 2.31½c to 2.36½c; Nos. 22 and 24, 2.36½c to 2.41½c; Nos. 25 and 26, 2.41½c to 2.46½c; No. 27, 2.46½c to 2.51½c; No. 28, 2.56½c to 2.61½c; No. 29, 2.66½c to 2.71½c; No. 30, 2.76½c to 2.81½c. We quote on lots from warehouse stocks as follows: No. 10, 2.10c to 2.15c; No. 12, 2.15c to 2.20c; No. 14, 2.20c to 2.25c; No. 16, 2.30c to 2.35c; Nos. 18 and 20, 2.50c to 2.55c; Nos. 22 and 24, 2.55c to 2.60c; No. 26, 2.70c to 2.75c; No. 27, 2.75c to 2.85c; No. 28, 2.85c to 2.95c; No. 29, 3c to 3.05c. Galvanized sheets, mill shipments, Chicago delivery, are quoted as follows: Nos. 12 and 14, 2.56½c; No. 16, 2.71½c; Nos. 18 and 21, 2.86½c; Nos. 22 and 24, 3.01½c; No. 26, 3.21½c; No. 27, 3.41½c; No. 28, 3.61½c; No. 29, 3.86½c. Jobbers' prices on lots from store have also been revised, and are now as follows: Nos. 10 to 14 inclusive, 3.10c; No. 16, 3c; Nos. 18 and 20, 3.10c; Nos. 22 and 24, 3.25c; No. 26, 3.50c; No. 27, 3.70c; No. 28, 3.95c; No. 29, 4.40c; No. 30, 4.85c.

Structural Steel.—None of the buildings reported last week as being figured on have progressed beyond this stage, nor have any new projects come up for discussion. The market is without change except that jobbers are complaining of the delay in mill shipments. General specifications are heavy. Prices are very firm, and on quick deliveries premiums are asked. With this reservation, we quote mill shipments, Chicago delivery, as follows: Beams and channels, 3 to 15 in., inclusive, 1.76½c; angles, 3 to 6 in., ¼ in. and heavier, 1.76½c; angles, larger than 6 in., on one or both legs, 1.86½c; beams larger than 15 in., 1.86½c; zees, 3 in. and over, 1.76½c; tees, 3 in. and over, 1.86½c; with the usual extras for cutting to exact lengths, punching, coping, bending or other shop work. We quote prices from store as follows: 2.10c to 2.25c for angles, beams and channels, base sizes, with 2.20c to 2.30c for 18, 20 and 24-in. beams; tees and zees, 2.15c to 2.25c. These prices are for either random lengths or cut to specifications in excess of 5 ft.

Plates.—The local situation is unchanged. New business is of light volume because of the inability of mills to give deliveries within three months from the date of placing order. The Western producer is out of the market entirely. Premiums are easily obtained for prompt shipments. We quote carload lots, mill shipments, Chicago delivery, as follows: Tank steel, ¼ in. and heavier, 6⅛ in. to 100 in., 1.76½c base; flange steel, 1.86½c base; marine steel, 1.96½c base, all full extras. Plates, 3-16 in. thick, $2 extra; gauges 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. Store quotations are as follows: Tank steel, ¼ in. and heavier, up to and including 72 in. wide, 2c; over 72 in. wide up to 100 in., 2.10c; over 100 in. wide, usual mill extras, 3-16 in. up to but not including 72 in. wide, 2.10c; 3-16 in., 72 in. wide, 2.35c; flange steel, 25c extra; heads, 25c extra.

Rails and Track Supplies.—There was some demand last week for heavy sections, but all the tonnage went to Eastern mills. Specifications to the Chicago mill are very heavy, the entire output going into immediate consumption. The demand for light rails has grown rapidly of late, the Milwaukee mill being sold up for the next three to four months. We quote heavy sections in 500-ton lots and over f. o. b. mill, $28; less than 500 tons to carload lots, $30; less than carload lots, $32. Light rails are as follows: 12-lb. sections, $27; 16-lb., $26; 20 and 25-lb., $25; 30, 35, 40 and 45-lb. sections, $24, all f. o. b. Milwaukee mill. Track supplies, f. o. b. Joliet mill. Angle bars, 1.40c to 1.50c; spikes, first quality, 1.75c to 1.80c; track bolts, 3¼ x ¾, with square nuts, 2.40c to 2.50c per lb., with hexagon nuts, 2.55c to 2.65c.

Merchant Steel.—While the buying for last half requirements has not been heavy, there has been a number of small orders placed for special grades which in the aggregate make up a good tonnage. Inquiry for future needs is active, and specifications against old contracts are exceedingly heavy. We quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 2.10c; sleigh shoe, flat sizes, 1.71½c; concave and convex, 1.86½c; cutter shoe, 2.35c; smooth finished machinery steel, 1.91½c; smooth finished tire, 1.86½c; plow steel, 2.20c and upward according to quality; toe calk steel, 2.21½c. Cold rolled shafting, 50 percent off in carload lots and 45 percent in less than carload lots. Crucible tool steel, 61½c to 8c; special grades of tool steel, 13c and upwards.

Merchant Pipe.—Some falling off is noted in the mill demand for pipe, which is attributed to the fact that jobbers have not yet disposed of the large stocks contracted for before the recent advance. Otherwise the situation is strong. We quote carload lots, mill shipments, random lengths, f. o. b. Chicago, as follows:

	Steel. Black. Percent.	Steel. Galv. Percent.	Iron. Black. Percent.	Iron. Galv. Percent.
MERCHANT PIPE.				
⅛ to ¼ inches	65.85	49.85	63.85	47.85
⅜ to ½ inches	69.85	57.85	67.85	55.85
¾ to 6 inches	73.85	63.85	72.35	62.35
7 to 12 inches	68.85	53.85	67.35	51.85
PLUGGED AND REAMED.				
1 to 4 inches	71.35	61.35	69.85	59.85
EXTRA STRONG PIPE.				
⅛ to ⅜ inches	58.85	46.85	56.85	44.85
½ to 4 inches	65.85	53.85	63.85	51.85
4½ to 8 inches	61.85	49.85	59.85	47.85
DOUBLE EXTRA STRONG PIPE.				
½ to 8 inches	54.85	43.85	52.85	41.85

Boiler Tubes.—The demand for tubes is very active and

prices are strong. Local jobbers have made no change in their prices since the recent mill advance. We quote carload lots, mill shipments, Chicago delivery, as follows:

	BOILER TUBES. Steel.	Iron.	Seamless.
1 to 1½ inches	40.35	37.35	53.00
1¾ to 2¼ inches	54.35	39.35	40.00
2½ inches	56.35	44.35	43.00
2¾ to 5 inches	62.35	51.35	
			Up to 4½ inches 50.50
6 to 13 inches	52.35	37.35	

Less than carload lots from store, as follows:

	Steel.	Iron.	Seamless Steel.
1 to 1½ inches, inclusive	40	35	42½
1¾ to 2¼ inches, inclusive	50	35	35
2½ inches, inclusive	52½	35	30
2¾ to 5 inches, inclusive	60	47½	42½
6 inches and larger	50	35	

Cast Iron Pipe.—The leading interest reports that all its plants are operating to full capacity. During the week under review, this company closed a contract for between 13,000 and 14,000 tons of water pipe, from 20 in. to 48 in., for delivery to the city of New Orleans, at a price considerably less than the quotations given below. In addition, contracts were taken for 1,500 tons of pipe for Duluth, Minn.; 500 tons for Humboldt, Kan., and 1,000 tons for Lincoln, Neb., besides several smaller orders. Carload quotations are without change, and we quote, Chicago delivery, as follows: 4-in., $29; 6-in. and larger, $28; gas pipe, $1 a ton higher.

Wire Products.—The summer dullness is felt a little earlier this year than usual, as already a falling off in demand is noticed. It is stated, however, and this belief is based on reports from leading jobbers, that the consumption during the hot months will be heavier this year than has been the case in the past, on account of the early spring and the consequent early crops. Jobbers and independent producers continue to shade prices on farming material. A meeting will be held in this city next Thursday of the independent wire interests to talk over the situation and to discuss prices for the last half. Rumors are current that there will be an advance as a result of the meeting, but these are not given much credence in this market. We quote the prices of the leading interest for carload lots to jobbers, Chicago delivery, as follows: Wire nails, $1.95; painted barb wire, $2.10; galvanized barb wire, $2.40; smooth annealed wire, $1.80; smooth galvanized wire, $2.10; polished staples, $2.05; galvanized staples, $2.35. Less than carload lots fo jobbers are 5 cents higher than above prices. The retail trade is quoted 5 cents extra over the foregoing on carload lots, and 10 cents extra on less than carload lots. Bale ties are unchanged at 82½ and 5 percent and 85 percent discount f. o. b. Waukegan, Ill., on straight carload lots. Poultry netting, 85 and 5 percent. discount from list f. o. b. Joliet and DeKalb, with actual freight allowed not exceeding 30 cents per 100 lb.

Foundry Coke.—Trading in coke is limited to carload transactions for prompt shipment. This is usually demurrage coke which is offered at prices below what is asked for fuel on contract. Good Connellsville coke that has accumulated here is frequently offered at $5 Chicago, a reduction of at least 50 cents a ton from the price which producers of standard grades are asking on contract shipments. Wise county, Va., coke is quoted $2.90 ovens or $5.15 Chicago. Other brands of Virginia and West Virginia cokes are held at $2.50 to $2.75 ovens.

Old Material.—The weakness of bar iron has dulled the inquiry for scrap and the local market is without life. Mills are willing enough to buy, but only at their price, which dealers will not meet. Railroads and country dealers continue to unload large tonnages on the market which tends to further depress prices. With the exception of railroad and agricultural malleable, stove plate and No. 1 cast, we have reduced all our prices at least 50 cents a ton. Dealers' quotations, gross tons, are as follows:

Old steel rails (4 feet and over)	$14 50 to 15 00
Old steel rails (less than 4 feet)	13 50 to 14 00
Old iron rails	19 00 to 19 50
Relaying rails, subject to inspection	22 00 to 22 50
Old wheels	14 50 to 15 00
Heavy melting steel	13 00 to 13 50
Mixed country steel	10 50 to 11 00
Low phosphorus scrap (.05 and under)	13 50 to 14 00

The following quotations are for net tons:

No. 1 R. R. wrought	14 00 to 14 50
No. 2 R. R. wrought	13 00 to 13 50
Shafting	15 00 to 15 50
Dealers' forge, No. 1	11 00 to 11 50
Wrought pipe and flues	10 00 to 10 50
No. 1 cast, 150 lb. and less	13 00 to 13 50
No. 1 mill	9 50 to 10 00
No. 1 Busheling	10 00 to 10 50
No. 2 Busheling	9 00 to 9 50
Country sheet	7 50 to 8 00
No. 1 boilers, cut	10 00 to 10 50
Boiler punchings	12 50 to 13 00
Iron car axles	20 50 to 21 00
Steel car axles	15 00 to 16 00
Iron axle turnings	10 00 to 10 50
Cast borings	7 00 to 7 50
Mixed borings, etc.	7 00 to 7 50
Machine shop turnings	9 50 to 10 00
Railroad malleable	12 50 to 13 00
Agricultural malleable	11 50 to 12 00
Stove plate and light cast scrap	9 50 to 10 00
Old iron splice bars	17 00 to 17 50

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
BROWNING BUILDING, May 10.

Iron Ore.—The shipments of ore from upper lake ports in April were as follows: Escanaba, 253,299 tons; Marquette, 104,279; Ashland, 61,697; Superior, 190,703; Duluth, 263,842; Two Harbors, 321,353; making a total of 1,195,173. There were no shipments in April, 1904, on account of the strike of lake captains. The movement this month has been much slower than was anticipated. Delay in making shipments is due principally to the heavy rains, which have interfered with mining operations. A sale of a small tonnage of ore is made occasionally, but there are few inquiries. Quotations are as follows: Old range Bessemer (56.70 percent iron natural, .05 phosphorus), $3.85 to $4; Mesabi Bessemer, same content, $3.65 to $3.75; old range non-Bessemer (52.80 percent iron natural), $3.35; Mesabi non-Bessemer (52.80 percent iron), $3.20.

Pig Iron.—The failure of the steel corporation to purchase Bessemer for May delivery has caused much discussion and has had a depressing effect on the market in general. It is hinted in some quarters that the corporation is not disposed to buy from furnaces identified with an independent steel plant project, but this view is not generally entertained and the common explanation of the absence of the corporation from the market is the very simple one that the iron is not needed. There is very little demand at present for any kind of iron.

Foundries are, as a rule, covered for the first half and are not disposed to contract for delivery beyond June. Prices are softening and $15.75 Valley has been done on No. 2 foundry, while reports of $15.50 are heard. Southern iron is weaker and no difficulty is experienced in buying at $13.25 Birmingham, for No. 2. The price of foundry coke has declined to $2.50, although some interests will not take orders at that price. We quote as follows, Cleveland delivery:

Bessemer	$16 10 to 16 35
No. 1 Foundry	16 75 to 17 00
No. 2 Foundry	16 25 to 16 50
No. 3 Foundry	15 50 to 15 75
No. 2 Southern	16,85 to 17 00
Gray Forge	15 75 to 16 00
Gray Forge, Southern	15 35 to 15 50
Lake Superior charcoal	18 00 to 18 25

Finished Material.—Among the sales of the week were 5,000 tons of standard rails for a steam railroad and 1,500 tons of light rails. There is a good prospect of orders being placed by traction lines, whose plans have been delayed on account of failure to finance the companies. A sale of billets was made at $30, Chicago, for delivery in Cleveland in 90 days. While mills are far behind on their

orders for structural material, some of the larger constructing companies have heavy stocks on hand and are able to furnish material for new buildings with reasonable promptness. The largest producer of plates can not give quick delivery; but other companies are now able to deliver in two or three weeks. A fair business is being done in bar iron at 1.60c at the mills. There is little demand for boiler tubes or pipe. Reports of cutting in sheets are more numerous and it is evident that some consumers contracted for a larger tonnage than they are using. The prices of the principal producers through jobbers are as follows: Cleveland delivery, the freight from Pittsburg being 9½ cents; mill sales of black sheets in carload lots, No. 10, 1.89½c; Nos. 11-12, 1.94½c; No. 14, 2.04½c; No. 16, 2.09½c; No. 27, 2.49½c; No. 28, 2.59½c. Galvanized mill sales, No. 14, 2.64½c; No. 16, 2.74¼c; Nos. 18-20, 2.89½c; Nos. 22-24, 3.04½c; Nos. 25-26, 3.24½c; No. 27, 3.44 ½c; No. 28, 3.64½c. Out of stock, black sheets, ¼ in., 1.95c; 3-16 in., 2.05c. Blue annealed, No. 10, 2.15c; No. 12, 2.20c; No. 14, 2.25c; No. 16, 2.35c. One pass cold rolled: Nos. 18-20, 2.55c; Nos. 22-24, 2.60c; No. 26, 2.65c; No. 27, 2.70c; No. 28, 2.80c; No. 30, 3.20c. Galvanized out of stock, No. 16, 2.95c; Nos. 18-20, 3.05c; Nos. 22-24, 3.20c; No. 26, 3.40c.

Old Material.—Dullness continues and transactions are so few that it is difficult to obtain quotations. There is a deadlock between buyers and sellers. We quote gross tons, Cleveland, as follows:

Old iron rails	$21 00 to 22 00
Old steel rails (over 6 feet)	15 50 to 16 50
Old steel rails (under 6 feet)	15 50 to 16 50
Old car wheels	15 50 to 16 50
Steel boiler plate	12 50 to 13 50
Steel axles	16 50 to 17 50
Malleable iron (railroad)	15 00 to 16 00
Malleable iron (agricultural)	14 00 to 15 00
Heavy steel	14 50 to 15 00

We quote as follows, net tons:

No. 1 R. R. wrought	15 00 to 16 00
No. 1 busheling	13 00 to 14 00
No. 1 machine cast	13 50 to 14 00
Iron axles	21 00 to 22 00
Axle turnings	11 00 to 12 00
Wrought turnings (free from cast)	10 50 to 11 50
Grate bars	9 00 to 10 00
Pipes and flues	11 50 to 12 50
Tank iron	10 00 to 11 00
Hoop and band iron	7 50 to 8 50
Sheet iron	6 50 to 7 50
Wrought drillings	10 50 to 11 50
Stove plate	9 50 to 10 50
Cast borings	7 00 to 8 00

CINCINNATI.

May 9.

Pig Iron.—The market the past week has continued exceedingly dull, with few sales reported. One amounting to about 400 tons was made to a local melter on an analysis basis, the price being equivalent to $13 Birmingham for No. 2 foundry. An inquiry last week for 1,000 tons by a Louisville consumer resulted in the buyer concluding to defer the purchase. The evident willingness of sellers to offer inducements for the business led the prospective purchaser to conclude that lower prices would probably be obtainable later. There has been scarcely enough trading to establish prices and the market is considerably unsettled. It is generally accepted that $13 Birmingham for No. 2 foundry can be done, and Southern furnaces are in a receptive mood, being not disposed to decline business at prices below recent schedules. The easier feeling has encouraged buyers to continue their waiting policy, and salesmen find difficulty in awakening any interest whatever on the part of buyers. Selling agencies freely express the opinion that the market needs a stimulant, and a good round lot inquiry which would result in a purchase that might serve as a basis for determining prices would be welcomed. Gray forge is in abundant supply and could be purchased freely at $12 Birmingham. This is accounted for to some extent by the urging of scrap iron upon bar mills at attractive prices. In Ohio irons, some re-sale transactions have been reported at prices equivalent to $15.50 at furnace for No. 2 foundry and it is intimated that this price could be done at the furnaces on a firm offer.

Southern Foundry No. 1	$16 25 to 16 50
Southern Foundry No. 2	15 75 to 16 00
Southern Foundry No. 3	15 25 to 15 50
Southern Foundry No. 4	15 00 to 15 25
Southern Foundry No. 1, soft	16 25 to 16 50
Southern Foundry No. 2, soft	15 75 to 16 00
Gray Forge	14 75
Northern Foundry No. 1	17 40 to 17 65
Northern Foundry No. 2	16 90 to 17 15
Northern Foundry No. 3	16 40 to 16 65
Southern Charcoal	19 25 to 19 50

Finished Material.—Jobbers continue to report an active demand and difficulty in getting mill shipments forward. Prices have made no change and are well maintained. Trade in bar iron continues quiet. Bar iron continues quiet but not quotably changed at 1.60c; steel bars at 1.63c; half extras, with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets at 75 and 7½ percent off. We quote black sheets, No. 27, at 2.40c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. 27, 2.60c; No. 16, 2.20c; No. 14, 2.10c; No. 12, 2.05c; No. 10, 2c. Tank plates are firm and sell out of store at 2c for ¼-in. and 2.10c for 3-16, No. 8 and No. 10. Beams and channels are quoted at 2c from stock and angles at 2c to 2.05c for base sizes.

Merchant pipe shows a steady tone and demand is moderately active. The leading interest is firmly maintaining its schedule with the independent manufacturers operating in a manner not calculated to importantly disturb quotations. Quotations are as follows f. o. b. Cincinnati:

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black.	Galv.	Black.	Galv.
	Percent.	Percent.	Percent.	Percent.
⅛ and ¼ inches	65.35	49.35	63.35	47.35
⅜ and ½ inches	69.35	57.35	67.35	55.35
¾ to 6 inches	73.35	63.35	76.85	61.85
7 to 12 inches	68.35	53.35	66.85	51.35

Old Material.—The market continues easy and unsettled with dealers urging their holdings upon melters at concessions to effect sales. The following represent current quotations, but on some descriptions could probably be shaded:

Old No. 1 railroad wrought, net tons	$15 00 to 15 50
Cast machine and foundry, net tons	13 00 to 13 50
Old iron rails, gross tons	19 00 to 19 50
Old steel rails, gross tons	15 00 to 15 50
Old short lengths, gross tons	13 50 to 15 00
Old iron axles, net tons	20 00 to 21 00
Stove plate, net tons	9 00 to 9 50
Wrought turnings, net tons	11 00 to 11 50
Cast borings, net tons	8 00 to 8 50
Car wheels, net tons	15 00 to 15 50

Coke.—The market is dull and quotations are lower. Furnace coke is quoted at $1.85 and foundry coke at $2.50 on contract f. o. b. Connellsville. Spot coke is weak and irregularly lower.

NEW YORK.

OFFICE OF *The Iron Trade Review,*
ROOM 1315, NO. 150 NASSAU ST., May 9.

Pig Iron.—The local market during the week was a little more active than for the previous fortnight, but the outlook is for quietness in the immediate future at least. Prices have shown a weakening tendency during the past few days, and declines are mentioned particularly in Southern brands, sales of No. 2 foundry having been made on the basis of $13 Birmingham for immediate shipment. One selling firm is still quoting $13.50, but this is for delivery in the balance of the year. In Northern irons all grades can be purchased at 25 cents a ton cheaper than a week ago, No. 2 being available at Eastern Pennsylvania furnaces at $16.25, although there are some interests that are quoting 25 cents higher. New England sales at concessions have been frequent, Northern and Southern grades alike figuring in them. Foreign irons have advanced appreciably of late, a significant fact being that

for the first time in five years Cleveland brands are ruling higher than Scotch irons. New York quotations at tidewater follows: Northern No. 1 foundry, $17.50 to $17.75; No. 2 foundry, $17.25 to $17.50; No. 2 plain, $16.75 to $17; Southern No. 1 foundry, $17.50 to $17.75; No. 2 foundry, $17.00 to $17.25; No. 3 foundry, $16.50 to $16.75; No. 4 foundry, $16.25 to $16.50. Quotations foundry pig iron warrants follow:

	Bid.	Asked.
May	$15.75	$15.85
June	15.75	16.00
July	15.75	16.00

Finished Iron and Steel.—While there were no contracts of any magnitude placed for structural shapes during the past week, there was some good business done in small lots, the tonnage booked by the American Bridge Co. alone being about 12,000 tons. Some excellent contracts are pending, which can be conservatively estimated at 40,000 tons. Some time ago we announced that 80,000 tons would be required for the new Manhattan bridge. The city authorities will issue the specifications about June 1. Small orders for fabricated material are going begging nowadays, not even the smaller independent companies caring to take them. The market is completely in the hands of sellers, and buyers must accept any terms offered them, particularly as regards delivery. New business in plates keeps on coming in regularly, and in bars and sheets conditions during the week were much better than they have been. We quote New York prices at tidewater: Angles, 3 to 6 in. x ¼ in. and heavier, 1.74½c; beams, 3 to 15 in., 1.74½c.; channels, 3 to 15 in., 1.74½c; beams, 18, 20 and 24 in., 1.84½c; tees, 3 x ¼ in. and heavier, 1.79½c; plates, carloads, tank, 1.74½c; flange, 1.84½c; marine and ordinary firebox, 1.94½c; refined iron bars, 1.64½c; soft steel bars, 1.64½c to 1.67c; sheets, in carload lots, New York, No. 28, black, 2.50c to 2.55c; galvanized, 3.60c to 3.70c.

Old Material.—There was only a fair degree of activity in the market during the week, with prices on the whole not as strong as they have been and very irregular. To give an absolutely reliable quotation for anything on the list is almost an impossibility. Heavy steel scrap seems to be the only firm item, but sold off nevertheless. Stocks are accumulating, and it would seem that the future course of the market is more likely to be determined by offerings than by the demand. Should the former continue to be made, prices will undoubtedly develop further weakness. Quotations approximately f. o. b. New York follow:

Old iron rails	$20 00 to 22 00
Old steel rails, long lengths	15 50 to 16 50
Old steel rails, short pieces	14 50 to 15 00
Relaying rails	20 00 to 21 00
Old car wheels	15 50 to 16 50
Old iron car axles	21 75 to 22 75
Old steel car axles	18 00 to 19 00
Heavy melting steel scrap	14 50 to 15 50
No. 1 railroad wrought scrap	18 75 to 19 50
Iron track scrap	17 00 to 18 00
Wrought pipe	13 50 to 14 50
Ordinary light iron	9 50 to 10 50
Cast borings	8 00 to 8 50
Wrought turnings	11 50 to 12 50
No. 1 machinery cast	14 50 to 15 25
Stove plate	12 00 to 13 00

PHILADELPHIA.

May 9.

Market conditions during the past week simply serve to accentuate those noted for the previous week. In pig iron there is little doing in the way of new business, and every one seems waiting to see what the next few weeks will develop—whether the unprecedented production will break the market or the mills and foundries will be able to absorb nearly 2,000,000 tons a month. In some branches of finished material mills report a more insistent demand than ever. Old material prices sag lower and lower. The general attitude seems to be one of expectancy. There is no doubt that the collapse of prices in Wall Street has caused some uneasiness. An interesting event locally is the arrival of a cargo of 2,000 tons of pig iron from Nova Scotia. There seems to be some doubt whether this is intended for export business or is to go into domestic consumption.

Pig Iron.—Few orders are reported, but furnacemen, with their product generally sold for many weeks ahead, are not disposed to weaken materially in prices. Possibly a week or two hence may tell a different story. This refers to standard irons. Inferior brands are offered at material concessions, but it is not fair to quote these as showing the range. Some high authorities are disposed to believe that the productive blast furnace capacity of the country is now somewhat in excess of the demand, and that a curtailment of output is necessary if prices are to be maintained. In the meantime these show no great change, though here and there a quarter is clipped off to make a sale. We quote:

No. 1X Foundry	$18 25 to 18 50
No. 2X Foundry	17 75 to 18 00
No. 2 Plain	17 00 to 17 50
Standard Gray Forge	16 00 to 16 50
Ordinary Gray Forge	15 50 to 15 75
Basic	16 75 to 17 00
Low phosphorus	20 75 to 21 00

Finished Material.—A steadily increasing demand for structural steel and plates more than offsets a little easing up in some other branches, and sellers report buyers as more urgent than ever in their demands for prompt delivery and more willing to pay premiums. With the large amount of new building now in sight the structural mills are assured of steady work for many months. Prices remain unchanged as follows: Beams, channels and angles, according to specifications, 1.73½c to 1.85c; refined iron bars, 1.73½c to 1.80c; steel bars, 1.63½c to 1.70c; plates, 1.73½c to 1.80c.

Old Material.—The bottom seems to have dropped out of prices, which in many lines are 50c or more lower than last week. The mills refuse to buy except at their own terms, and as they seem to be well supplied with scrap comparatively few sales are being made. Prices may be quoted as follows:

Old steel rails	$16 00 to 16 50
No. 1 steel scrap	16 00 to 16 50
Old steel axles	20 50 to 21 50
Old iron axles	23 75 to 24 75
Old iron rails	21 50 to 22 50
Old car wheels	15 00 to 16 00
Choice scrap, R. R. No. 1 wrought	19 50 to 20 00
No. 1 yard scrap	17 50 to 18 00
Machinery scrap	15 00 to 15 50
Low phosphorus scrap	21 50 to 22 00
Wrought iron pipe	15 00 to 15 50
No. 1 forge fire scrap	15 25 to 15 75
No. 2 forge fire scrap, ordinary	11 50 to 12 00
Wrought turnings	13 50 to 14 00
Axle turnings, heavy	15 00 to 16 00
Cast borings	10 00 to 11 00
Stove plates	11 00 to 12 00

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., May 9.

Pig Tin.—The tendency of the local market throughout the past week was to weakness, to which an adverse statistical situation and light trading were the main contributors. The action of futures would indicate a dull summer with lower prices. The London market has been quiet, with prices considerably lower than a week ago. Today's closing follow: Spot, 29.95 to 30.15c; May, 29.95 to 30.12½c; June, 29.75 to 30.00c; July, 29.50 to 29.75c. London's closing's today follow: Spot, £136 12s 6d; futures, £134 7s 6d. Arrivals at Atlantic ports for the month to date aggregate 320 tons, with 1,920 tons afloat.

Copper.—There has been no change in prices during the past week, and trading if anything showed a falling off. Buyers are tenaciously committed to buying on the hand-to-mouth plan. London during the week was quiet, with prices practically unchanged. Today's closings follow: Lake and electrolytic, 15c nominal; casting, 14¾c

nominal. London's closings today follow: Spot, £65 5s; futures, £65 10s. Exports for the month to date amount to 3,411 tons.

Lead.—The local and St. Louis markets remain quiet and unchanged for spot, being 4.50c to 4.60c, and 4.50c respectively. London slightly higher at £12 13s 9d.

Spelter.—There has been a further decline in spot, which is now quoted at 5.65 to 5.75c. St. Louis declined to 5.45c. London is unchanged at £23 10s.

Antimony.—All grades are firm ,Cookson's selling at 8½c to 8⅝c, Hallett's at 8¼c to 8½c, and other brands at 7½c to 8.12c.

Quicksilver.—We quote $38 per flask of 75 lb. lots of 100 flasks. London £7 7s 6d.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, May 9.

The accumulation of a large stock of spelter and pig tin in the hands of dealers, together with the light volume of buying, has weakened prices of these products. Spelter is off ¼ of a cent and pig tin ½ a cent. Despite these lower prices, however, buyers have not come into the market in any volume. They continue to buy only from hand to mouth. Copper is without change, and lake is quoted at 15¼c for carload lots, and 15⅜c for less than carload lots. Casting copper, 15c for carloads and 15⅛c for less than carload lots. Spelter, 5¾c for carload lots, and 6c for lesser quantities. Sheet zinc is without change at 7¼c for carload lots of 600-lb. casks, and 7½c for less than carload lots. Pig tin, 30¾c for carload lots, and 31c for less than carload lots. Pig lead, 4.45c for 50-ton lots; 4.50c for carload lots, and 4.55c for lesser quantities. Antimony, both Cookson's and Hallett's, is quoted 9½c.

Old metals are in light demand and prices are weak. We quote copper wire 13¼c; heavy copper, 12¾c; light copper, 11¾c; red brass, 11½c; red brass borings, 9¾c; yellow brass, 8¼c; yellow brass borings, 7c. Pipe lead, 4c. Tea lead, 3.60c. Zinc, 4.15c.

Wabash Railroad Connections at Pittsburg.

Arrangements for the connection of the Wabash Railroad at Pittsburg with the terminal lines of the United States Steel Corporation subsidiary companies in the Pittsburg district have been finally agreed upon and the work of connecting the Wabash system in order that it will get the tonnage promised by the Carnegie Steel Co., Ltd., in Central Traffic Association territory will now be carried out. The Wabash road was promised one-fourth the tonnage of the Carnegie mills in Central territory if they would extend their lines into Pittsburg. In addition to this a proportional tonnage from the other mills of the United States Steel Corporation in the Pittsburg district will go to this road.

Connections will be made with the West Side Belt Railroad, a branch of the Wabash recently acquired, and the St. Clair Terminal Railroad, which connects with the Clairton plant of the Carnegie Steel Co., and the Union Railroad, which serves all of the plants of the Carnegie Steel Co. at Homestead, Braddock and Duquesne. Switching arrangements will also be made with other terminal roads serving other plants of the United States Steel Corporation in the Pittsburg district. In order to make these connections three tunnels will have to be built and the work will require at least a year.

The annual report of the General Electric Co. shows a decrease in the 1905 total sales compared with those of 1904 of $2,468,290, the figures for 1905 being $39,231,328, for 1904 $41,699,618. The total income for the two years was, 1904, $9,893,218; for 1905, $8,573,709, a decrease of $1,319,509. The surplus for 1904 was $2,810,987 and for 1905, $2,275,507, a decrease of $535,480. Vice President Eugene Griffin reported 187,350 separate orders, not including contracts during the year ending Jan. 31, an average of 624 per working day.

B. & O. ORDERS TEN THOUSAND CARS.

Contracts were placed last week by the Baltimore & Ohio Railroad for 10,000 freight cars, of which 6,000 will be of all steel construction and the remainder will be of wood with steel underframes.

The cars were distributed as follows: American Car & Foundry Co., 2,000 steel hopper cars and 250 refrigerator cars; Pressed Steel Car Co., 1,000 steel hopper cars and 1,000 steel twin gondolas; Western Steel Car & Foundry Co., Chicago, 1,000 box cars; Standard Steel Car Co., 1,500 steel gondolas with wooden sides; Cambria Steel Co., 2,000 steel twin gondolas; Rogers Ballast Car Co., Detroit, 250 ballast cars. The Baltimore & Ohio recently placed a contract for 250 locomotives and the expenditure by that road for equipment this year is greater than ever before. About half of these cars will be consigned for use in the coal, coke and iron trade of the Pittsburg district.

Among participants in the orders for railroad equipment let by the B. & O. last week is the American Steel Foundries. They will furnish the Baldwin Locomotive Works, for 250 B. & O. locomotives, approximately 15 tons of steel castings for each engine, including engine frames, driving wheel centers, cross heads and driving boxes.

Orders for locomotives and cars have been reported as follows: Erie railroad, 50 locomotives; Chicago & Northwestern, 35 locomotives; Chicago Southern, 28 locomotives; Buffalo, Rochester & Pittsburg, 20 cars; Harriman lines, 25 gasoline motor cars; Atchison, Topeka & Santa Fe, 300 refrigerator cars; Higgins Oil & Fuel Co., six oil tank cars; Stearns Salt & Lumber Co., 50 freight cars; Queen Mahoning Coal Co., 500 steel hopper cars; New York, New Haven & Hartford, 300 box cars; New York, Pennsylvania & Southwestern, 8 passenger cars, four combination cars, 100 box cars, 10 flat cars; Chicago, Rock Island & Pacific, 200 flat cars.

Franklin Rolling Mill & Foundry Co.

The stockholders of the Franklin Rolling Mill & Foundry Co., of Franklin, Pa., will hold a meeting May 28, to consider the plan recently submitted to its creditors. The plan is to call in all outstanding first mortgage bonds and issue others; to call in all present outstanding preferred stock and issue new 6 percent priority preferred stock; call for a $10 contribution on the total issue of common stock; issue to holders of first mortgage bonds, dollar for dollar of the new bonds and preferred stock; issue to holders of present preferred stock 25 percent of the new preferred for each share of the old outstanding; to issue to secured creditors first mortgage bonds for the aggregate amount of their principle indebtedness and preferred stock at par for the interest to Jan. 1, 1906; to issue to holders of common stock 50 percent in first mortgage bonds and 50 percent in preferred priority stock for the amount contributed by them; to issue to unsecured creditors preferred priority stock for the total amount of their respective claims, with interest to Jan. 1, 1906. If these plans meet with the approval and coöperation of the creditors, the directors of the company feel the business of the company can promptly be placed on a sound and paying basis.

J. G. Butler, Jr., chairman of the Bessemer Pig Iron Association, states that the percentage of furnaces in operation, using Lake Superior ore, is exactly the same on May 1 as on April 1. The United States Steel Corporation had in blast May 1, 96 percent of its total capacity; the Republic Iron & Steel Co., 100 percent; and the Bessemer Pig Iron Association, 100 percent.

The Sanderson Bros.' Steel Co., of Syracuse, N. Y., a part of the Crucible Steel Co. of America, is working night and day with a force of 800 to 850 men and shipments have broken all previous records from this plant.

PERSONAL.

Homer C. Curtis, formerly of Big Rapids, Mich., has been appointed general superintendent of the Mashek Iron & Chemical Co., of Escanaba, Mich.

J. S. Runnells, general counsel for the Pullman Co., has been elected vice president of the company, vice T. H. Wickes, deceased. He will still remain as head of the legal department. Geo. F. Brown, formerly general manager, was appointed treasurer and K. Demmler, formerly assistant secretary was appointed assistant treasurer. F. B. Daniels was appointed general solicitor; E. R. Slager manager of sales department and Thos. Dunbar manager of the Pullman Car Works.

M. H. Levagood, of the Western Automatic Machine Screw Co., Elyria, O., has sold his interest in that concern and has announced his intention to retire after an active participation in the management of the business for 33 years.

William E. Corey, president of the United States Steel Corporation sailed for Europe last week and expects to be gone about 10 weeks.

James Hunter has resigned as cashier of the American Exchange bank, of Duluth, to assume the active management of the Atikokan Iron Co., which controls the iron ore deposits on the Atikokan range near Port Arthur, Ont.

Chas. H. Hodges, formerly treasurer of the American Radiator Co., has been elected second vice president, succeeding E. A. Sumner, deceased.

J. W. Bullock, of the Bullock Electric Mfg. Co., of Cincinnati, sails from Boston for Naples May 13 to spend three months in Europe.

L. D. Bolton, heretofore Chicago representative of the Federal Mfg. Co., is now with the Diamond Chain & Mfg. Co., of Indianapolis, and will represent that company in the Middle and Western States.

Among those who are candidates for election to the Iron and Steel Institute are Taylor Allderdice of the National Tube Co., Pittsburg; Quincy Bent, of the Lebanon Furnaces, Stedman Bent, of the Pennsylvania Steel Co.; Prof. H. C. Boynton, of Harvard; David T. Croxton, of the Cleveland Furnace Co.; C. R. Darrow, of Youngstown, Theodore Dwight, of New York; Frank Firmstone, of Easton, Pa.; Joseph Hartshorne, of Pottstown, Pa.; J. H. Lloyd, of Alliance, O.; T. C. Martin, editor of the *Electrical World;* E. L. Messler, of the Soho Furnaces; W. H. Morgan, of Alliance, O.; T. Robins Jr., president of the Robins Conveying Belt Co.; J. P. Roe, of Pottstown, Pa.; H. E. Edwards, of the Lincoln Foundry, Pittsburg; Joseph Wharton, of Philadelphia, and Edward R. Wood Jr., of R. D. Wood & Co., Philadelphia.

G. W. Caldwell, president of the National Machine Co., Columbus, Ind., has become general manager of the company, succeeding R. O. Boyer, resigned.

Amos Shepard, mining superintendent for Corrigan, McKinney & Co., will probably take an extended vacation and trip through the South and West before he returns to active work. He is recovering rapidly from the serious injuries received at Duluth six weeks ago.

George K. Hosford, Cleveland representative of Rogers, Brown & Co., has returned to Cleveland from Pasedena, Cal., where he spent the winter.

Wm. G. Clyde, for the past three years assistant sales agent of the Carnegie Steel Co., at Cleveland, has entered upon his new duties as assistant general manager of sales, Pittsburg, in charge of the bar bureau. On the evening of May 6, a few of Mr. Clyde's friends tendered him a dinner at the Union Club and presented him a handsome case of silver. Ira B. Bassett was toastmaster and responses to the informal toasts were highly complimentary to Mr. Clyde.

F. M. Eaton, of Hickman, Williams & Co., Cincinnati, finds that his health is much improved under relief from work, but he will prolong his stay in the West until he has fully recovered and will probably be absent from his office for several weeks longer.

C. H. McCullough Jr., of New York, assistant to the president of the Lackawanna Steel Co., has removed to Buffalo, assuming the duties heretofore performed by Geo. L. Reis, vice president, who recently resigned.

E. D. Green, secretary of the Garden City Fan Co., Chicago, has just returned from a three months' vacation spent in Europe, Egypt and the Holy Land.

Theodore Morgan, formerly rolling mill superintendent at Muskegon, Mich., has been appointed manager of the plant of the New Castle Forge & Bolt Co., New Castle, Pa., succeeding Frank Ryman, who retains his connection with this concern in the capacity of traveling sales agent.

OBITUARY.

John Farrel, a pioneer in the manufacture of safes, died at his home, Rochester, N. Y., May 1. He was born in Paterson, N. J., in 1830. He was graduated from the Poughkeepsie Academy and shortly afterward became connected with the manufacture of safes. Mr. Farrel made numerous experiments with steel and chemicals, which led to the perfecting of safes. He also developed fireproofing and combinations.

Charles F. Dunbar, of Buffalo, director and largest stockholder of the Buffalo Foundry Co., and one of the pioneer dredge owners and contractors on the lakes, died at his home Castle Inn, Buffalo, on the morning of May 1. He was born at Boston, Mass., in 1830, and at the age of 14 became fireman on a lake dredge, his father being foreman. From that he went into railroad building and in 1863, in partnership with Franklin Lee began extensive marine operations, later inventing the submarine drill.

Greenville Plant to be Rebuilt.

The Greenville, Pa., plant of the Carnegie Steel Co., Pittsburg, is to be practically rebuilt, and an additional mill will be added for rolling bars and hoops. The new mill will be a tandem 7 and 10 in. of large capacity. The present puddling furnaces will be entirely rebuilt and new boiler capacity aggregating 1,000 h. p. will be added. The rolling of hoops for kegs and barrels will be carried on at this mill on a large scale. Recently the Carnegie Steel Co. began the rolling of a beaded hoop to replace the wooden hoop on nail kegs and flour barrels and this has met with much success. The hoop is retained in place with nails and at all of the plants of the American Steel & Wire Co. in the Pittsburg district machines are in operation which automatically nail the hoops on the kegs. The steel from which the hoops are made is so soft and the material so thin that the nails which are driven to hold them in place readily pierce the steel, there being no necessity of first punching holes for the nails. This hoop is now to be introduced to the flour trade and a large tonnage is expected from this great industry. Many experiments have been made in the past with hoops of this kind for flour barrels, but have invariably met with failure. This hoop is also said to be far superior to the wire hoop which was used quite extensively in place of the wooden band.

Directors of the Shelby Iron Co., Shelby, Ala., have declared a dividend of 5 percent, payable June 1. The dividend was passed last year. Books will be closed May 25 and reopen June 2. The capital stock of the company is $1,000,000.

The Cedar Rapids Machinery & Supply Co., of Cedar Rapids, Ia., has been incorporated and will handle general supplies, belting, brass goods, tank pumps, covers, mill supplies and will operate a machine shop. Building and overhauling engines will also be a part of the business.

The foundry of the Hardie-Tynes Mfg. Co., of Birmingham, Ala., which was destroyed by fire March 12, has been rebuilt, with an increased capacity, and was placed in operation on May 1.

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LATTER-DAY BLAST FURNACE TROUBLES.

Since the publication of Mr. James Gayley's paper on the application of dry air blast to the manufacture of iron, last October, the wonderful revelations it contained as to the saving of fuel and the increased production of iron, resulting from the introduction of the refrigeration process at Isabella furnaces have been first in interest among blast furnace men the world over. But the change which the experiments conducted under Mr. Gayley's direction will bring in the blast furnace world has been regarded as something that will develop slowly. Meantime an ever-present and everyday problem with blast furnace managers throughout the country has been the troubles incident to the introduction of mechanical charging at blast furnaces. Twelve years ago, when Mesabi ores were introduced, blast furnace managers in the Central West, who were vying with each other in efforts to increase the percentage of these cheap ores in their mixtures, were having a very active experience with slips and explosions; and those who ventured beyond the 25 percent limit that seems to have been agreed upon in early practice with these ores had no end of trouble with a regular working. Then followed the movement for the erection of larger furnaces, and outputs were carried to new high records, the 500-ton furnace being followed by the 600-ton stack, and monthly records of 17,000 and 18,000 tons were not unusual.

But in all this strain for large outputs the furnace managers were put to their wits' ends to cope with troubles that were not only of weekly, but almost daily occurrence. It was found that where large amounts of fine ores were used in big furnaces, the tendency was to irregularity, with frequent slips and the making of much "off" iron. The irregular working led to greater fuel consumption, and furnaces that were built with the expectation that their mechanical appliances would work wonders in economy, often made very disappointing records in cost of iron.

The advent of the skip hoist and the double bell has not been followed by all the good things predicted for them. At the meeting of the American Institute of Mining Engineers at Washington, last week, one of the members called attention to four furnaces of modern construction, built or remodeled within the past two years, all of which developed a hot spot within a few months after blowing in, compelling relining of two, with the probability of a comparatively short campaign in the case of the others. These troubles have been attributed to bad distribution, and are assignable in part to the fact that the skip can only discharge its load into the hopper from one side. Engineers who have been at work on the problem have presented various remedies, including the construction of a rotary hopper, and such apparatus is already in successful operation. It was recommended in the paper referred to above, which was presented by John J. Porter, of Chicago, that the rotary distributer might be somewhat simplified by substituting for the side opening and door on the revolving hopper a central opening closed by a small bell suspended in such a way as to rotate freely with the hopper.

When mechanical filling was first introduced its principal advantage was considered to be the saving of labor; but of almost equal importance, its elimination of irregular charging was emphasized. It is safe to say, however, that poor distribution has been the prime evil with which blast furnace managers have contended in the past few years. Perhaps in no equal time have so many changes been made in the personnel of blast furnace managements. Men of long experience in the work have found new difficulties constantly confronting them, but traceable for the most part to the multiplication of mechanical devices for feeding the furnace. To the remedying of these troubles some of the best engineering talent of the country is now being directed, and a fortune awaits the inventor of a simple distributing mechanism that shall drop the stock into the furnace in as nearly as possible the way in which it was dumped from barrows in the days of hand filling, yet without encumbering the top of the furnace with machinery preventing ready changes in cases of emergency.

THE LAKE ORE MOVEMENT IN 1905.

A leading officer of the United States Steel Corporation is quoted as estimating the total water shipments of iron ore from the Lake Superior region this year at 32,000,000 tons at least. While we were among those who were disposed to question the 30,000,000-ton estimate made in the latter part of 1904, developments since that time give good ground for thinking that this figure will be exceeded very considerably, barring accidents, strikes, or other serious interruptions to the program of the leading shipper. In 1902, when the total shipments from all Lake Superior mines were 27,571,121 tons, including 531,952 tons shipped by all-rail, the Steel Corporation shipments

were 16,136,787 tons. This gave a total of 11,434,334 tons for all other shippers. For the present year the Steel Corporation's program has been estimated variously between 16,000,000 and 20,000,000 tons. If the latter figure proves to be the correct one, it is not difficult to see how the total could reach 33,000,000 tons, which is the outside figure given by optimistic prophets of this year's business. The total of 32,000,000 tons named by the Steel Corporation official appears to be based upon shipments of about 19,000,000 tons for the Corporation, which would indicate that after the sharply restricted movement of 1904 the Corporation expects to return again to the policy followed in 1902 of bringing down ore sufficient to maintain an ample reserve in furnace yards and on docks, to guard against mining or vessel strikes or any other interruptions to the lake movement. In 1902, the Corporation shipped 58.5 percent of the total sent from the Lake Superior ranges. If it should move 19,000,000 tons this year and other shippers should send down the same percentage as in 1902, the total for 1905 would be close to 32,500,000 tons.

An increase of 50 percent in Lake Superior ore shipments in any year over the record of the preceding year is entirely without parallel, wonderful as some of the fluctuations have been in the lake ore trade. Yet it is entirely probable that something like that increase will be seen in 1905 over the record of 21,822,839 tons made last year. The amazing possibilities of recuperation in the iron trade after a period of limited demand are scarcely appreciated even by those who make a business of studying it most narrowly.

SLIDING SCALE PRICE CONTRACTS.

Reference has been made in these columns recently to the negotiations under way between five blast furnace companies in the Mahoning and Shenango valleys, and a steel company that has a Bessemer plant under construction which will be ready for operation in the summer of 1906. A long-term contract is to be made for the delivery of Bessemer iron to the steel company, and the satisfactory arrangement of a sliding scale of prices is the principal problem. It is understood that Bessemer iron is to be sold at two-thirds the price of Bessemer billets. With Bessemer billets at $21, pig iron would bring $14, and on $24 billets the pig iron price would be $16. The "spread" between the market price of Bessemer pig iron and the market price of Bessemer billets has varied considerably in the last ten years. Thus, in the summer of 1897, when Bessemer steel sold as low as $13.75 at Pittsburg steel works, pig iron reached $9.50 delivered at the same works. The "spread" here is $4.25. In the '90's, following the panic of 1893, the normal "spread" between Bessemer iron and Bessemer steel was reckoned to be about $5. An important item in the calculation is 10 to 12 percent for waste of metal, which gives materially higher conversion cost as the price of Bessemer iron advances. Advances in wages have also been a factor in recent years, as compared with the low wage basis of the period of depression referred to; but it is also to be considered that tonnages have increased greatly in the same interval, so that the unit of labor cost has been diminished very considerably.

As an interesting matter of comparison, we append the sliding scale basis for the five-year contract made in 1899 between the Carnegie Steel Co. and the American Tin Plate Co. for the delivery of sheet and tin plate bars to the latter. The figures on the left give pig iron prices, and those on the right represent the additions to be made to arrive at the price of sheet bars. The proposition is the reverse of the one referred to at the beginning of this article. In the one case pig iron is the base and the price of steel is to be determined; in the other the market price of steel is the starting point and the price to be paid for steel is sought:

Pig Iron	Add for Sheet Bars
$ 8.99 or under	$5.45
9.00 to $9.99	5.60
10.00 to 10.99	5.75
11.00 to 11.99	6.00
12.00 to 12.99	6.25
13.00 to 13.99	6.50
14.00 to 14.99	6.75
15.00 to 15.99	7.00
16.00 or over	7.25

It will be seen that the above schedule differs in several particulars from that proposed in the contract recently under discussion. The increments in the case of steel are small as compared with those in pig iron, but an important difference between the two propositions is that the Carnegie contract started with a greater differential than 50 percent of the price of pig iron. When pig iron is at $11.99, by the above scale, it will be seen that the differential of $6 makes it tally almost exactly with $18 steel and $12 pig iron under the arrangement proposed between furnaces and steel works. Another parallel point is when steel is at $19.50 and pig iron is at $13. The variations between the two propositions are greatest when prices are extremely high or extremely low.

The application of the sliding scale arrangement to long-time contracts for raw materials is becoming more and more of a factor in all departments of the iron trade. In iron mining the sliding scale of royalties has been in use for a number of years. Fee owners have been inclined to prefer definite royalties, and on the Mesabi range, fixed amounts are the rule; but a graduated royalty based on the selling price of ore on Lake Erie dock is finding more and more favor. In the iron ore market the first of the long-time contracts that are now so common were made at a fixed price, and even in the past year contracts have been drawn specifying a uniform price for ore over five and ten-year periods. Foundry iron producers, however, have preferred in some cases to have their product, which is perhaps the freest of all from the influence of agreements or associations, made the basis of their ore contracts. There are ore contracts based on the market for steel billets, and it is known that steel bars have been under consideration as a

basis for a sliding scale of Bessemer ore prices, the thought being that the changes in bar prices, in spite of association influences, more nearly represent the changing conditions of the market, than those of other finished products.

That sliding scale agreements between sellers and consumers of important forms of raw or semi-finished materials in iron and steel, will make for stability and serve to counteract the tendency to wide fluctuations so long characteristic of the business, is the best reason for expecting their increasing adoption.

Technical Publicity Association.

An address on "The Machinery for Marketing Machinery," was presented at the annual dinner of the Technical Publicity Association in New York on April 27 by Emerson P. Harris, broker in trade and technical journals. This organization represents over 30 large manufacturers. The members of the association, nearly all of whom were in attendance at the dinner, are: Philip P. Kobbe, Rand Drill Co., president; H. M. Cleaver, Niles-Bement-Pond Co., vice president; C. B. Morse, Ingersoll-Sergeant Drill Co., second vice president; Geo. H. Gibson, International Steam Pump Co., secretary; H. M. Davis, Sprague Electric Co., treasurer; Rodman Gilder, Crocker-Wheeler Co., and Graham Smith, Westinghouse companies, executive committee; H. T. Lauretzen, Holophane Glass Co.; F. S. Wayne, Robins Conveying Belt Co.; Lucius I. Wightman and Fred C. Iglehart, Ingersoll-Sergeant Drill Co.; M. C. McQuiston and J. O. Little, Westinghouse companies; C. P. Hutchins, Jos. Dixon Crucible Co.; F. C. Cheston, American Wood Working Machinery Co.; Dean Park, Hammacher, Schlemmer & Co.; F. R. Matthews, De La Vergne Machine Co.; Dixon Boardman, Hall Signal Co.; F. H. Gale, General Electric Co.; C. S. Redfield and R. R. Glenn, Yale & Towne Mfg. Co.; A. E. Michel, International Steam Pump Co.; A. N. Barber, John A. Roebling's Sons Co.; W. B. Snow, B. F. Sturtevant Co.; E. F. Schaefer, Rand Drill Co.; H. H. Kress, Cameron Steam Pump Works; F. B. Vail, American Air Compressor Works; Arthur Warren, Allis-Chalmers Co.; A. E. Newton, I. T. E. Co.

Mr. Harris's address discussed the growing influence of the trade and technical press and its increasing power as a machine for marketing machinery.

Application has been made for a receiver for the Delphos Foundry Co., Delphos, O.

The directors of the American Radiator Co. have declared the regular quarterly dividend of 1¾ percent on the preferred stock, payable May 15, to stockholders of record May 6.

The first run of the Fort Worth Iron & Steel Mfg. Co., of Fort Worth, Texas, was made April 26 and the results were very satisfactory to the company.

The Meadville Malleable Iron Co., Meadville, Pa., finds that its increased capacity is no more than adequate to take up its increasing business. Starting with only sixty men on the pay roll a few years ago, the number has been increased to nearly 300. In addition to the buildings erected a year or so ago, D. C. McDonald, secretary and treasurer, reports the installation of a new melting furnace a month ago and in about two weeks another new annealing furnace will be ready.

The litigation for the control of the Burden Iron Co., of Troy, N. Y., has been amicably adjusted and the two brothers, I. Townsend Burden and James A. Burden, have dropped the fight which has been in progress for a score of years over property worth several million dollars.

The Labor Situation.

AMALGAMATED ASSOCIATION CONVENTION.

(Special Telegram.)

DETROIT, May 10.—The Amalgamated Association of Iron, Steel and Tin Workers in its convention today adopted the recommendation of the wage committee in favor of the restoration of the 1903-1904 scale for boiling, muck or puddle mills, piles on boards, busheling, knobbling, heating slabs and shingling, bar and 12-in. mills; guide, 10-in., hoop and cotton tie mills, and skelp mills. This carries $5 instead of $4.90, for puddling on a 1c card. The price remains at $5 until 1.3c bar iron is reached, when an advance is made to $5.25, and there is 25 cents additional for each .1c advance in bar iron.

The recommendation of the wage committee for the restoration of the cut of 18 percent in sheet and tin plate wages made last year was under discussion when the convention adjourned at noon until tomorrow morning.

The report of the treasurer showed a balance in the treasury of about $75,000 as compared with $125,000 a year ago. The strikes conducted during the year cost the association a large sum of money and efforts will be made to strengthen this fund.

MERGER WITH N. M. T. A.

The executive committee of the Cincinnati Metal Trades Association held a meeting on May 9 to consider the question of merging the association with the national body. The committee approved a resolution providing for such merger and arranged for the resolution to be submitted to the Cincinnati Metal Trades Association members at the annual meeting which will be held on May 18.

WILL RECOMMEND ADVANCE.

The seventh annual convention of the Tin Plate Workers' Protective Association convened at Wheeling, W. Va., on Tuesday morning, April 9. The wage committee met on Monday and will recommend to the convention the adoption of a scale which will carry an advance of nearly 10 percent over the scale which will expire the middle of July.

ATTEMPT TO ORGANIZE MINERS.

C. G. Keniston, who was mixed up in the Hibbing, Minn., strike of two weeks ago, claims to have organized the miners at Eveleth and at Buhl, Minn., and to be about to start unions all along the Mesabi range. This may be true, but it is doubtful if the men engaged in much of the mining operations of the Minnesota districts are such as will be held by organization. Mr. Keniston has gone back from whence he came, to Colorado, and says he will return to the Mesabi as soon as possible and finish his work. This is the first attempt to organize common miners on this range, and it is questionable whether it can succeed permanently, or, if it does, whether it will be of benefit to any other than the organizer. Keniston claims to have 250 members at Eveleth and 50 at Buhl, and that he will have 300 to 500 at Hibbing. This would pay him quite well.

METAL TRADES ASSOCIATION NOTES.

The program for the regular monthly meeting of the New York Metal Trades Association at the Hotel St. Denis on May 9, provides for a dinner following the business session. Stanley G. Flagg, Jr., president of the Metal Manufacturers' Association of Philadelphia, and Marshall Cushing, secretary of the National Association of Manufacturers, were scheduled to make addresses.

The polishers and buffers of the Standard Sewing Machine Co., of Cleveland, went out on strike on May 4, owing to the refusal of a nine hour day.

At the meeting of the executive board of the St. Louis Metal Trades Association this week a report will be pre-

sented by J. W. Leigh, the secretary of the association, giving the result of his canvass of the membership in regard to making the St. Louis association a branch of the N. M. T. A.

The picketing of the office of the Manufacturers Association of Philadelphia has been discontinued.

Reports from Pittsburg indicate a scarcity of machinists in that city.

The executive committee of the Cincinnati Metal Trades Association meets at the office of that association this week, to consider the question of merging this association with the national body.

LABOR NOTES.

It is reported in Washington that President Shaffer of the Amalgamated Association of Iron, Steel and Tin Workers, may succeed J. Hampton Moore of Philadelphia in the Department of Commerce and Labor, but it is not yet clear whether Mr. Shaffer is not merely carrying his previous protests against standing for re-election a little farther than customary. He has been receiving telegrams at Detroit this week from sub-lodges importuning him to remain.

Between 56 and 60 members of the Amalgamated Sheet Metal Workers' International Alliance, walked out at Louisville, Ky., May 3, and demanded the closed shop policy and the limitation of apprentices. The employers are organized and say they will resist the demand.

A settlement of the strike at the plants of the Whitaker-Glessner Co., Wheeling, W. Va., was effected on Friday, May 5, with the district board of the Amalgamated Association and some of the men returned to work the next day. The Wheeling plant will be placed in operation first and the Martins Ferry, O., plant will follow. The terms of the settlement have not been given out.

The sheet metal and roofing manufacturers and Local No. 46, of Rochester, N. Y., have entered into an agreement covering wages for the next two years. The men get a uniform advance of 10 percent.

The Amalgamated Sheet Metal Workers' International Association is taking a referendum vote on the question of holding a convention this year in June to strengthen the financial policy of the organization. The present per capita tax of 20 cents a month, of which one-half goes into a defense fund, has been found entirely inadequate to meet the growing claims on the national organization. Death benefits and general expenses have to be paid out of a tax of 10 cents a month, and the plan proposes to increase the revenue, both in the defense and in the general funds.

Taking effect May 1 the Colorado Fuel & Iron Co., of Pueblo, Col., increased the wages for common labor receiving 13½ and 14½ cents per hour, to 15 cents per hour and also made an adjustment and raise in the rates of mechanics and other employes who were paid by the hour. The increase did not apply to monthly or tonnage men.

The eighth annual convention of the United Mine Workers of District No. 20 will be held at Birmingham, Ala., beginning Monday, June 20.

One hundred helpers at the Berry Foundry & Mfg. Co.'s plant at St. Joseph, who struck recently for an increase of 25 cents a day, have returned to work at the old scale. The company dealt with the men individually and not as an organization.

At a meeting of the representatives of the American Shipbuilding Co. and of the Chicago unions of shipbuilders, an agreement was made to advance the pay of the workmen 2 1-3 cents an hour on all repair work. The 500 workmen in the South Chicago works had been threatening a strike unless the advance conceded them was granted.

The strike of boilermakers of the Erie Railroad at Galion, O., has been ended. The company has filled the strikers' places with non-union men.

IRON ORE STOCKS AT LAKE ERIE PORTS.

While last May statistics collected from the various Lake Erie dock managers by the *Marine Review* showed that on May 1 the stocks of iron ore at Lake Erie ports were greater than on the same date in any year in the history of the trade, the amount being 4,534,103 gross tons, the statistics for the first day of this month show that the ore on dock was less than in any year since 1900, the amount on May 1, 1905, being 2,271,631 tons, while on May 1, 1900, there were 1,720,656 tons on dock. The statistics for three years are as follows:

IRON ORE ON LAKE ERIE DOCKS—GROSS TONS.

Ports.	May 1, 1905.	May 1, 1904.	May 1, 1903.
Toledo	71,642	160,216	126,331
Sandusky	44,444	68,863	56,500
Huron	68,100	208,008	147,817
Lorain	165,586	237,404	190,311
Cleveland	513,559	968,508	829,347
Fairport	390,869	579,677	555,709
Ashtabula	623,451	1,559,028	1,073,967
Conneaut	96,295	128,018	125,400
Erie	236,414	474,275	427,744
Buffalo	61,271	150,106	60,241
	2,271,631	4,534,103	3,593,367

The total rail shipment from Lake Erie ports to furnaces in the winter of 1904-05 appear by comparing dock stocks on Dec. 1, 1904, and May 1, 1905:

	Gross tons.
On dock Lake Erie ports, Dec. 1, 1904	5,763,399
On dock May 1, 1905	2,271,631
By rail to furnaces, winter of 1904-05	3,491,768

Adding these winter shipments to 16,658,806 tons, the amount shipped to furnaces during the navigation season of 1904, gives 20,150,574 tons as the entire consumption of ore from Lake Erie ports during the year ended May 1, 1905, as against 18,739,995 tons for the year ended May 1, 1904; 21,905,251 tons in the year ended May 1, 1903; 17,216,065 tons in the year ended May 1, 1902; 14,468,260 tons in the year ended May 1, 1901; 15,882,881 tons in the year ended May 1, 1900; 12,122,982 tons in the year ended May 1, 1899; and 10,209,488 tons in the year ended May 1, 1898. The following table gives stocks and shipments to furnaces during the years named:

ORE ON LAKE ERIE DOCKS, MAY 1, EACH YEAR FOR TEN YEARS.

Year.	Gross tons.	Year.	Gross tons.
1905	2,271,631	1900	1,720,656
1904	4,534,103	1899	2,073,254
1903	3,592,367	1898	3,167,915
1902	2,848,194	1897	3,256,497
1901	3,050,183	1896	1,949,698

ORE SHIPMENTS, LAKE ERIE PORTS TO FURNACE, YEARS ENDING,

May 1, 1905	20,150,574	May 1, 1902	17,216,065
May 1, 1904	18,739,995	May 1, 1901	14,468,260
May 1, 1903	21,905,251	May 1, 1900	15,882,881

IRON ORE SHIPMENTS, LAKE ERIE PORTS TO FURNACES, DURING WINTER PERIOD, DEC. 1 TO MAY 1.

Winter of	Gross tons.	Winter of	Gross tons.
1904-05	3,491,768	1901-02	3,011,469
1903-04	1,836,982	1900-01	2,854,487
1902-03	3,481,887	1899-1900	3,809,627

The Merchant & Evans Co., with home offices at 517 Arch street, Philadelphia, has purchased from Merchant & Co., Inc., all its property and assets and assumed all its liabilities. Powell Evans has organized and is president of the new company, which will continue the manufacture and distribution of metals, adhering strictly to the methods in vogue under the old management.

The Norwalk Mfg. Co., of Norwalk, O., which, two years succeeded the Norwalk Foundry & Machine Co., has in turn disposed of its foundry department to John Books, Aaron Townhill and Andrew Hamilton, of Cleveland.

ACTIVITY ON THE IRON RANGES.

Managers of the International Harvester Co. have been examining their mines on the Mesabi and Baraboo ranges the past week. They intend to mine about 400,000 tons at Hibbing and Baraboo during the year, of which all but 75,000 tons will come from Hibbing. The company's Hawkins mine has started up for the year, and is now making a good daily production. Its Agnew has been busy for some time. Its Illinois, at Baraboo, is mining about 5,000 tons a month, but this amount will be increased later. The water proposition there is still a bad one.

The Jones & Laughlin Steel Co. is to sink a three-compartment shaft 800 feet deep at the old Rolling Mill mine, near Negaunee, on which it has a 20-year lease from Capt. Samuel Mitchell. The company has been drilling there for some time and doubtless has located a good deposit of better ore than the mine has ever produced from its surface workings. The Rolling Mill was for a time in control of Capt. Sellwood, who called it the Chester, and mined the lean silicious Bessemer that was found there. This ran about 40 percent in iron and 38 in silica, and about .025 in phosphorus. But an 800-ft. shaft would scarcely be sunk for any such product, especially as this is to be found in large quantities near the surface. About 50,000 tons of this lean ore will be mined this year and shipped to the company at Pittsburg. The mine is an old one and has been idle most of the time for some years. Now new equipment will be installed throughout and a number of buildings are to be erected at once.

There were severe rain and snow storms on the Mesabi and other lake ranges last week, and some of the open pit mines were flooded for some days. Hull, Morris and Burt suffered particularly.

G. A. St. Clair has found that about 100,000 tons of good ore in the old and abandoned Hale mine, near Biwabik, and is stripping it with a steam shovel. There is a possibility that the deposit may be much larger. It will be mined this year for Pickands, Mather & Co.

At a meeting of stockholders of the Brotherton and Sunday Lake mines at Duluth last week E. A. S. Clarke of New York, Moses Taylor of New York and Messrs. M. G. Dalton, H. S. Haselton and C. E. Lawrence were elected directors of the two companies. Mr. Clarke was elected president, Mr. Taylor vice president and treasurer, and Mr. Haselton, secretary at a meeting of the directors. The properties are owned by the Lackawanna Steel Co. C. H. Munger, who has been mine manager for the company, is to have charge for these mines also. Capt. Sellwood, who has been operating them, did not care to continue in charge; indeed he has had little to do with them personally for some time.

The Oliver Iron Mining Co. will soon have a large and complete machine shop at Hibbing, and is putting in the walls now. The building will have an aggregate floor space of about 25,000 square ft. The construction is to be of steel with concrete foundations. The shops will be divided into carpenter, machine, blacksmith and foundry with engine house outside. The plant will be fitted with machines capable of handling anything in the way of machinery that the company uses, including 100-ton steam shovels or locomotives. Traveling cranes and hydraulic hoists will be in use and there will be every needed appliance for economical and rapid work.

The Abner Doble Co., of San Francisco, announces that arrangements have been made with the John McDougall Caledonian Iron Works Co., Ltd., of Montreal, Canada, whereby the latter become sole licensees for the manufacture of the Doble system of water wheels in the Dominion of Canada. The tangential water wheels and needle regulating nozzles manufactured by the Abner Doble Co. are well known for their excellence of design and workmanship, and considerable engineering interest has recently been shown in relation to the four 8,000-h. p. wheels which that company has built for operation in California power plants. The McDougall Co. has the most extensive machine works in Canada, the plant including machine shops, pattern shop, foundry, forging works and structural material shop. The plant is therefore well equipped for the manufacture of water wheels and other hydraulic machinery. It already has in hand the building of a 100-h. p. wheel to operate under 170-ft. head, taking water through a 3½-in. jet and having a speed of 130 revolutions per minute.

The Girard & Warren O., plants of the Carnegie Steel Co., Pittsburg, are being dismantled and much of the machinery is already being shipped to other iron mills formerly owned by the American Steel Hoop Co. Most of the machinery is being shipped to Greenville, Pa., although some is being sent to the mills at Youngstown.

The W. G. Wilkins Co., Pittsburg, has been appointed engineer for laying out the coal and coke plant of the Struthers Coal & Coke Co., of Cleveland. This company is controlled by the Struthers Furnace Co., Struthers, O., and 160 ovens will be built.

The district offices of the American Steel Foundries, now located at Alliance, O., will be moved to Sharon, Pa., on June 1.

A meeting of the stockholders of the Sharon Foundry Co., Sharon, Pa., will be held on June 26 for the purpose of voting on a proposed bond issue of $100,000. The additional funds thus acquired will be used in making extensive additions to the present equipment.

The Crucible Steel Co. of America is erecting a new steel building at its Park works, Pittsburg, 200 x 300 ft. The building will be of steel construction and will replace a number of smaller wooden structures.

The Buckeye Sand Co., Ferguson building, Pittsburg, has purchased a large tract of red molding sand at Marietta, O., which it will place on the market in addition to its Conneaut and Kingsville sand.

The executors of the estate of the late Henry W. Oliver, of Pittsburg, filed their first partial account last week. It indicates that the estate possesses personalty to a value of $14,253,819.61 and the real estate is said to be worth $7,000,000 more. The stocks held by the estate are numerous and valuable but the account shows that none of the shares of the bonds of the United States Steel Corporation were owned by the deceased. The principal items are as follows: 21,794 shares of Oliver Iron & Steel Co., $5,448,500; 96,290 shares Pittsburg Coal Co. common, $1,209,875; 12,200 shares Pittsburg Coal Co. preferred, $610,000; 19,797 shares Calumet & Arizona Mining Co., $1,187,820; 28,165 shares Calumet & Pittsburg Mining Co., $181,650; 17,250 shares Lake Superior & Pittsburg Mining Co., $127,500; 11,625 shares Pittsburg & Duluth Mining Co., $69,750; 2,750 shares New York Shipbuilding Co., $137,500; 11,000 shares Harvey Iron Co., $275,000; 583 shares Standard Car Co., $58,300; 1,819 shares Great Lakes Coal Co., $61,875; 7,000 shares preferred and 6,533 1-3 shares common, Detroit Iron & Steel Co., $42,000; 418 shares Standard Chain Co. preferred, $29,225; 155 shares Standard Chain Co. common, $10,944; 29 bonds of Standard Chain Co., $29,000; leases, Chemung Iron Ore, $4,000,000.

The Jones & Laughlin Steel Co., Pittsburg, has filed articles of incorporation in Wisconsin, showing that $50,000 of its capital stock will be invested in that State.

STOVE FOUNDERS' CONVENTION.

The Stove Manufacturers' National Defense Association held its annual meeting at the Auditorium Hotel, Chicago, on Tuesday, May 9. The sessions were private and the subjects discussed were of interest to the membership. On Wednesday, May 10, at 10 a. m., the National Association of Stove Manufacturers began a two days' session at the same place with a large representation of stove manufacturers in attendance. The committee of arrangements had prepared a program of unusual excellence. The social features included a smoker and a vaudeville on Wednesday evening; for Thursday an automobile ride was arranged for the ladies, ending with a lunch at the Washington Park Club. The committee of arrangements consisted of W. G. Henry, chairman, Chicago; W. H. Cribben, Chicago; E. C. Hanrahan, Chicago; R. L. Morley, Chicago; W. T. Bussey, Chicago, Lewis Moore, Joliet, Ill.; E. Raftery, Aurora, Ill.; H. A. Viets, Milwaukee; Geo. H. Barbour, Detroit; W. T. Barbour, Detroit; John M. Dwyer, Detroit; Wm. A. Dwyer, Detroit.

The subjects scheduled for the convention include the following: "The Science of Modern Business Building." Address by J. D. Kenyon, of Chicago, representing the Sheldon School of Scientific Salesmanship. "Modern System of Accounting: Suitable for Stove Manufacturing," by Geo. H. Barbour; "Foundry Costs," by Edmond Raftery; "Equalization of Prices" (exemplified), by E. C. Hanrahan; "Stove Repair Piracy,' by John R. McKnight. "The New Trademark Law," by John D. Green; "Value of Local Associations," by Geo. Mitchell; "The Future of the Pig Iron Market for 1905, and Its Effect Upon Selling Prices," by W. J. Myers; "Labor Saving Devices and Their Application to the Stove Business," by John Magee; "Cash Discounts: The Relative Advantages of the 5 Percent and the 2 Percent Cash Discounts. Which is Best for the Stove Trade?" by Abram C. Mott; "Malleable Steel Ranges: What is the Best Policy to Pursue Regarding Them in the Stove Business," subject for general discussion; "Are Selling Prices Sufficiently Remunerative as Based Upon Present Cost of Manufacture and Distribution?" subject for general discussion; "Uniform Standard Size of Catalogues," subject for general discussion.

Eastern Pennsylvania.

HARRISBURG, Pa., May 9.—Activity prevails in most of the iron and steel plants in this part of the state. While no important new orders have been placed lately, the companies are busy getting out the work on hand. Plate mills are rushed, being run night and day to keep up with demands from firms wanting quick deliveries. There are few idle furnaces in any of the Eastern Pennsylvania valleys and those are generally being repaired so that there is promise of a larger number of stacks working this summer than at any time in years.

The Pennsylvania Steel Co. is running its Steelton plant full these days and some large foreign orders for rails have been filled. The company's furnaces here are all at work and at Lebanon it will start one shortly.

Uppen Susquehanna mills are enjoying conditions of prosperity and there is a demand for men. Danville works are being started up with more men and at Williamsport the wire rope works will make improvements.

The report that the Hecksher interests operating the Swede furnaces in the Schuylkill Valley will build a new stack is denied. Eastern Steel Co. officials also deny any intention of further improvements at this time, being occupied in completing those under way.

The Standard Steel Works recently completed a large shipment of car wheels from its works at Burnham. The wheels are to be sent to the Pacific Coast and are said to be destined for Japan.

The Harrisburg Foundry & Machine Works have taken their ninth order for a large engine for the plant of the Goodyear Rubber Shoe Co., of Naugatuck, Conn. It is also building a 700 h. p. engine for the street railway company of Keokuk, Iowa. Three engines are being built for the Realty Corporation of Norfolk, Va.

The Lebanon Chain Works have completed a big shipment of chains for United States naval vessels.

Wilmer W. Marshall, head of the Juniata Furnace & Foundry Co., operating a blast furnace at Newport, Perry county, who died recently, was one of the first to establish a tin plate mill in the United States after the enactment of the McKinley tariff. He was active in the affairs of the Penn Treaty Iron Works and in various other projects. Another recent death is that of James Meily, the Lebanon iron master, who was interested in the Lebanon Iron Works, Lebanon Car Works and other concerns in the Lebanon Valley. He was also active in the affairs of the Stirling Boiler Works of Barberton, O. He was a graduate from Lafayette College. In recent years he had lived in Philadelphia.

The Phillips Sheet & Tin Plate Co., of Clarksburg, W. Va., recently incorporated, is putting a 70-ft. addition to its main building, erecting a new assorting room and new office building, but will not be in need of any new equipment.

An order for 6,000 of the R. E. Janney couplers, for application to 3,000 Lehigh Valley cars, has just been awarded to the American Steel Foundries. To take care of increasing business, the American Steel Foundries are making additions and improvements to their various plants.

The Abendroth & Root Mfg. Co., Newburgh, New York, has moved its Chicago office, of which Allan F. McIntyre is manager, to 410 Monadnock block. This company manufactures spiral pipe, water tube boilers, etc.

The plant of the Aultman Co. at Canton, O., was sold by Col. J. J. Sullivan, under orders from insolvency court May 9 and was bought in by the creditors' committee at $262,500, which was $50,000 above the appraised value of the plant. There were two other bidders who forced the committee to go above the appraised figure in order to get the plant. The creditors had already bought in the allied companies and the acquisition of the parent plant was a necessity to put others on a paying basis.

The Jamison Coal & Coke Co., Pittsburg, has taken over the interests of the Alexander Coal Co., contiguous to the Jamison holdings of the Pittsburg seam. The property is fully equipped for mining and the acreage taken over approximates 1,700.

W. C. McMillan, president and general manager of the Detroit & Cleveland Navigation Co., and Superintendent A. A. Schantz, have placed in the hands of Frank E. Kirby the work of designing a new steamer for the Detroit and Cleveland route. The new boat is to have a freight carrying capacity of 1,000 tons, carry 4,000 passengers, have 300 staterooms and 16 parlors, and will cost about $800,000. Mr. Kirby has suggested the boat be of the twin screw type, with guards, giving plenty of deck and cabin room. The competition of the electric and steam railroads during the summer has caused the new move on the part of the D. & C. line. W. C. Richardson, of Cleveland, has placed a contract for a new 9,000 ton freight steamer. Both boats will be out for the opening of navigation next season.

The Missouri Valley Bridge & Iron Co., Leavenworth, Kan., has closed a contract with the International & Great Northern railroad to replace all bridges with heavy steel material between Palestine and San Antonio. The work will aggregate $600,000.

The Crane Co., of Chicago, has formally taken over the property of the Eaton, Cole & Burnham Co., makers of gas fittings, at Bridgeport, Conn. Contract for the purchase was made several years ago.

AMERICAN SOCIETY FOR TESTING MATERIALS.

Dr. Richard Moldenke delivered an address upon "The Object of the American Society for Testing Materials" before the Civil Engineers' Club of Cleveland, on Friday, May 5. The speaker first reviewed the organization of the societies for testing materials in Europe, which resulted in the formation of the International Society for Testing Materials with divisions in each country. He noted the fact that the object of the societies in this country and Europe is radically different. In this country the prime object of testing and of the Society for Testing Materials, is to arrive at standard specifications for material used for manufacturing purposes, while in Europe the prime object of testing materials is for scientific research, and the making of specifications is a secondary matter. In many cases the European members of the society are government officials and they would have no authority to adopt standard specifications without special legislation on the part of their government. The engineering departments of each of the European governments have their own specifications and it would be very difficult for them to unite on any universal plan. In this country, however, engineers feel the need of universal standards and specifications and hence the American Society for Testing Materials, which is the branch of the International Society, was formed. This society has taken over most of the testing work previously done by various engineering societies, or it has worked in harmony with other engineering bodies, and from its work has resulted the adoption of standard specifications for many lines. There are now a number of committees working upon the subject.

Dr. Moldenke told of his visit to the International Congress held at Buda Pesth several years ago. There were only four American members present, and in the committee work he acted as interpreter between the various divisions. The proceedings of the International Congress for Testing Materials are conducted in three languages, French, German and English, there being two translators always on the platform and just as soon as the speaker makes a few statements, each translates it into his own language for the benefit of his fellow countrymen present.

After pointing out the importance of the work already done by the American Society, Dr. Moldenke made a plea for all engineers to support the work of the society by becoming members, taking part in the discussions and assisting the work in any way that they could.

Woodward Iron Co.

It is rumored that the Woodward Iron Co., Woodward, Ala., will build an open-hearth steel plant to operate in connection with its three blast furnaces. This company will this month blow in its third furnace, which has just been completed. It is opening new ore mines near its other mines, the object being to increase the ore supply incident to the blowing in of the new furnace, which is to take place now in a few days. The company's ores require a minimum of flux in the furnaces.

The Williamson Iron Co., Birmingham, Ala., and the Coosa Iron Co. (charcoal), will blow in a furnace each this month. The Tennessee Coal, Iron & Railroad Co. has given orders for a thorough repairing of two furnaces at Bessemer, the iron makers to be relined and otherwise worked on. The iron to be manufactured at the Williamson furnace, to go in blast about May 25, will be used at the cast iron pipe works at North Birmingham.

It is reported that the South Sharon plant of the American Sheet & Tin Plate Co. is filling a rush order for 30,000 boxes of tin plate for the Japanese government for army cans.

The Nicola Building Co., of Pittsburg, has contracts to build 400 houses at Lorain, for National Tube Co. employes. It has just completed 200 on previous contract.

PHILADELPHIA FOUNDRYMEN'S ASSOCIATION.

The 147th meeting of the Philadelphia Foundrymen's Association was held at the Manufacturers' Club, 1409 Walnut street, Philadelphia, on Wednesday evening, May 3, President Thomas Devlin occupying the chair. The secretary reported a balance in the treasury on April 5 of $2,190.12, and on May 3, $2,081.87, all bills being paid.

A letter was read from the American Foundrymen's Association in reference to the convention to be held in New York City on June 6, 7 and 8, inviting the Philadelphia Association to be present and to bring foundry friends to the meeting.

A communication from the chief of the Bureau of Manufactures, Washington, asking for general trade information, was referred to the executive committee.

Secretary Evans stated that at the June meeting the members would have the pleasure of hearing an address by a lady representative of the National Civic Federation.

The address of the evening was made by J. S. Robeson, of Philadelphia, who discussed "Some Core Binder Troubles." He referred to the various kinds of sands used in making cores, but particularly dwelt upon the binder and the characteristics it should have to produce the best results. The effect upon the efficiency of the binder produced by a change in sand was referred to and the speaker considered that many binders had been unjustly condemned because of variable results that had accompanied changes in sand. The paper in many of its features covered the same ground as the one which Mr. Robeson presented before the Pittsburg Foundrymen's Association at its February meeting. The speaker exhibited various samples of sand in use in foundries in Canada and the districts east of Pittsburg. The lantern slides were presented showing three cores: one made with rosin as a binder, another with a liquid binder and a third with a dry binder. The paper was discussed at considerable length, particularly by foundry foremen present.

The Hanna Engineering Works, of Chicago, have recently received orders for a large number of riveters, the largest being from the American Car & Foundry Co., which ordered 20 machines.

The H. W. Johns-Manville Co. has establish six new branches. These are at San Francisco, Seattle, Kansas City, Los Angeles, Little Rock and Minneapolis. The company now has 18 branches, including three in Europe.

The Buik Motor Co., Flint, Mich., has been reorganized with a capital of $500,000, and the company's two plants at Flint and Jackson will be consolidated into one plant at Flint.

Judge E. B. Dillon, of Columbus, O., on application of D. D. Byers, has appointed W. T. Wells and Q. R. Lane receivers for the Hallwood Cash Register and the International Manufacturing Co., both of Columbus. No allegation of insolvency was made, but the action is brought to clear away the indebtedness of the Hallwood company in the hands of the International.

The report that the mill site of Zug & Co., Pittsburg, has been sold to the Pennsylvania Railroad Co. for a consideration of $900,000 has been officially denied.

The New York office of the Ashton Valve Co., Boston, is now located at 128 Liberty street.

The Nova Scotia Steel & Coal Co. shipped its first cargo of pig iron from the furnaces at Sydney mines this season for Philadelphia on April 28.

The Charles Creighton Foundry Co., of New York, has assigned to Henry A. Koelsch. Liabilities are not known.

The Plant of the Birdsboro Steel Foundry and Machine Co.

The plant of the Birdsboro Steel Foundry & Machine Co. (formerly the Diamond Drill & Machine Co.), is located at Birdsboro, Berks Co., Pa. It has direct shipping facilities over the adjacent lines of the Pennsylvania railroad, Schuylkill division, main line of the Philadelphia & Reading R. R. and the main line of the Wilmington & Northern railroad. Birdsboro is 49 miles from Philadelphia, 139 miles from New York and 9 miles from Reading. The works consist of a steel foundry, 248 x 360 ft.; an iron foundry, 109 x 202 ft. 5 in.; the No. 1 machine shop, 78 x 170 ft. 8 in.; the No. 2 machine shop, 52 ft. 9 in. x 128 ft. 7 in.; the smith shop, 37 x 50 ft.; power house, 32 x 44 ft.; a boiler house, 41 ft. 2 in. x 45 ft.; a pattern shop, 50 x 60 ft.; and a pattern storage, 62 x 66 ft.

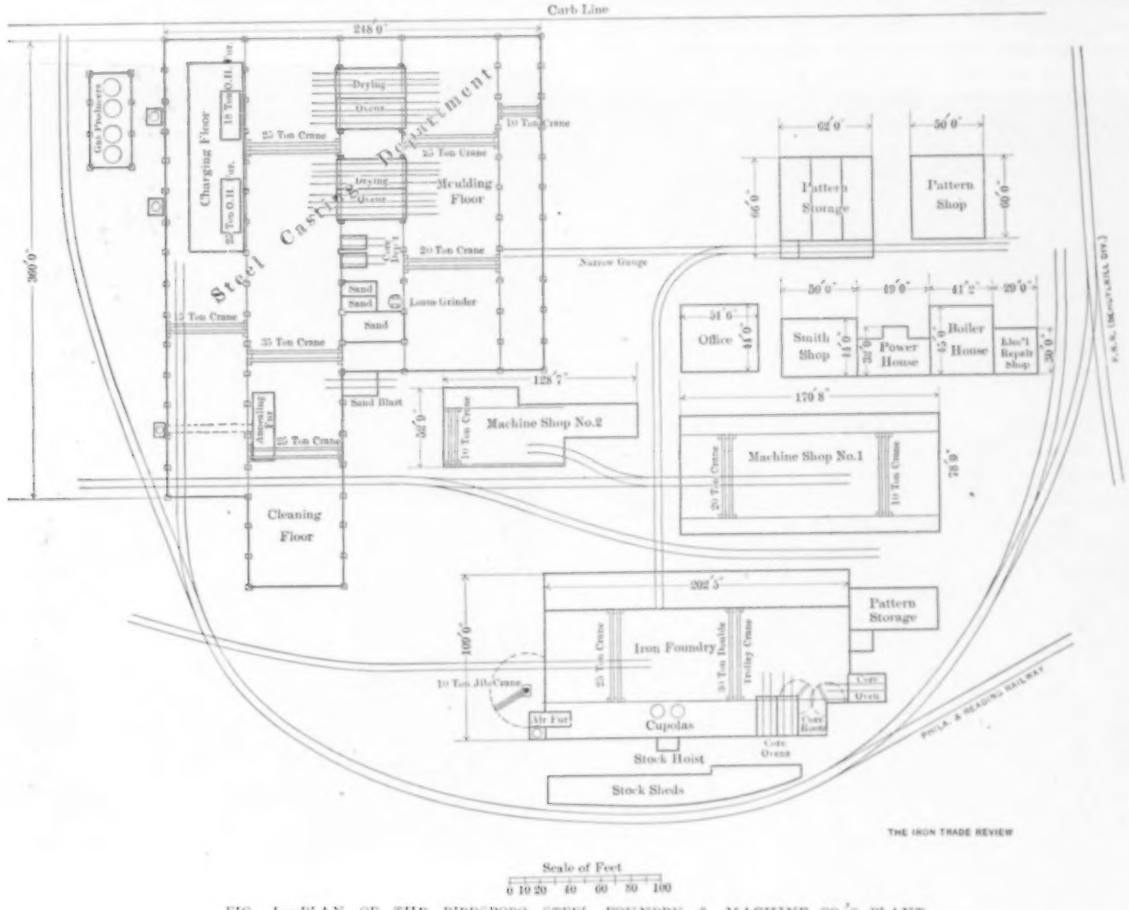


FIG. 1—PLAN OF THE BIRDSBORO STEEL FOUNDRY & MACHINE CO.'S PLANT.

Fig. 1 shows the general layout of the plant. Fig. 2 is an interior view of the machine shop. Fig. 3 is a view of the iron foundry taken from the core shop end. At the left are the two core ovens, following these are two cupolas, and just beyond the cupolas and on the same side—almost hidden by the loam mold—is to be seen part of the 20-ton air furnace. Fig. 4 illustrates the molding floor of the steel plant; on the left is the sand grinder, the core ovens, the three drying ovens, and on the right is the 20-ton open-hearth furnace. Fig. 5 shows a round nose cutter for a dredge; the company made all the patterns, the castings, did all the machine work, and, in fact, furnished the cutter complete. Fig. 6 depicts some marine engine cylinders involving excellent core work and molding. The two lower castings are the intermediate pressure cylinders and each weighs about 30,000 lb. The upper casting is one of the high pressure cylinders and weighs about 20,000 lb. These castings were furnished under government inspection and were made from air furnace iron. The Wagner cold saw cutting-off machines have already been illustrated and described in *The Iron Trade Review*. Fig. 7 is a somewhat different form to those which have appeared in these columns. This particular machine has a round table capable of rotation. The table may be removed or left in place and the table support has a vertical adjustment. The head is arranged with the saw blade in a horizontal position and the head can be placed at any angle.

The Steel Plant.

The steel plant is laid out with the molding floor parallel to the casting and cleaning floors. The structure is of brick and steel construction with a slag roof. The crane runways over the molding and casting floors are 30 ft. from the ground; the crane runway over the molding floor in the leanto is 18 ft. from the floor and the crane runway over the furnaces and the scrap floor is at a height of 22 ft.

The molding floor in the leanto is equipped with a 10-ton crane of 30 ft. span. The small castings are molded on this floor. There is also on this floor a gear molding machine for the production of cast steel gears up to 60 in. in diameter and 18 in. face. The main molding floor has one 20-ton and one 25-ton crane with 5 and 10-ton auxiliaries respectively. These cranes have a span of 60 ft. Between the casting and the molding floors are four drying ovens 40 ft. long and 18 ft. wide. There are also two core ovens, sand blast apparatus and loam grinders. This portion of the building is 220 ft. long.

The casting floor is equipped with two 25-ton cranes with 5-ton auxiliaries and one 35-ton with a 10-ton auxiliary. The span of these cranes is 60 ft. The length of this portion of the building is 360 ft. In this section is the dry floor, chipping floor and the machine shop for cutting off sink heads. This

portion of the building is equipped also with an annealing furnace, 10 x 10 ft. and 40 ft. long. A sand blast apparatus is located at this part of the building and right at the cleaning floor. Parallel to this floor is the building with the open-hearth furnaces, the remainder of the structure being taken up at present with scrap storage. This is served by a 15-ton crane, of 50-ft. span, traveling over the open-hearth furnaces and the scrap piles. These furnaces have a capacity of 18 and 25 tons respectively. The gas producer plant is arranged parallel to the steel casting plant and has four 10-ft. gas producers. Above the molding floor leanto is a pattern storage 30 ft. wide and 220 ft. long This contains the patterns required for active service—such patterns as are used so regularly that the placing of them in the regular pattern storage would not be warranted.

It will be noted that the tracks through the core ovens extend into both the molding floors and the casting floor. The cores are therefore loaded with the flask by means of the cranes over the molding floor and then pushed into the ovens. When the cores are thoroughly dried, the cars are drawn out of the ovens by the cranes over the casting floor, the flasks removed and then the car is lifted from the tracks and placed on a track located between the ovens. This latter track has a down grade onto the molding floor. By this means almost as soon as the car is unloaded it returns to the molding floor, is placed by the crane therein on the oven track and is again promptly ready for loading. After the flasks are shaken out they are placed on a car between the sand bin and the end of the building. The car is sent through to the end of the molding floor where the flasks are unloaded. It will be noted that by this means everything is in practically continuous operation.

The Iron Foundry.

The iron foundry consists of a molding and cleaning floor 60 ft. span with a leanto on each side about 20 ft. wide. The main runway is equipped with one 25-ton crane with a 10-ton auxiliary; the other crane being equipped with two 15-ton trolleys. The height of the runway for these cranes is 25 ft. about the floor. In the leanto on one side are made all of the small castings and on the leanto on the other side is the core room with two three-ton gib cranes, two core ovens, two cupolas of 5 tons and 10 tons capacity per hour and one air furnace with a capacity of 20 tons. The air furnace is served by a 10-ton electric gib crane. At one end of the foundry is another core oven and also a pattern storage for the patterns in active use. Iron castings have been made weighing as much as 40 tons per single casting. This building is of brick and steel construction with a slag roof.

Machine Shops.

Machine shop No. 1 has a main floor 30 ft. wide with leantos on each side 24 ft. wide. The main floor is served with one 20-ton crane, height of runway 20 ft. and one 10-ton crane, height of runway 40 ft. This building is of stone construction, three stories high. On the first floor are the heavy tools, the second floor has the light tools and the third floor is used at present for storage of diamond drill machinery and its equipment. Besides the small tools this shop is equipped with an 18 x 22-ft. boring mill, one 8-ft. square planer with 24-ft. bed, one 5-ft. square planer, 16-ft. bed, two 60-in. lathes, two horizontal boring mills, besides sundry lathes, shapers, keyseaters, etc.

Machine shop No. 2 is a frame construction and is served by one 10-ton crane with runway 15 ft. from the floor. This shop is equipped with three 40-in. lathes and one 40-in. gun boring lathe. This last lathe has a bed about 40 ft. long. The balance of the shop is used for erecting small machinery.

In the smith shop are three fires and one 800-lb. hammer.

Power Plant.

The power house is equipped with one 500 cu. ft. compound Ingersoll-Sergeant air compressor; one 160-h. p. Ames engine direct connected to a 100-h. p. General Electric Co.'s generator, and one 350-h. p. Westinghouse compound automatic engine, direct connected to one 250-h. p. General Electric Co.'s generator. The boiler house has one 100-h. p. Babcock & Wilcox, one 100-h. p. Gill water tube and one 200-h. p. Edge Moor water tube boiler. Adjoining the boiler house is the electrical repair shop.

Pattern Shop and Storage.

The pattern shop is of brick construction with slate roof and is three stories high. The first and second floors are equipped with machinery and benches for making patterns and the third floor is used as a lumber storage. The pattern storage is also of brick construction and slate roof, three stories high. The building is divided lengthwise into three departments by a 13-in. brick wall. This building is served by a 3-ton elevator.

Plant in General.

At present the plant employs about 500 men. The products

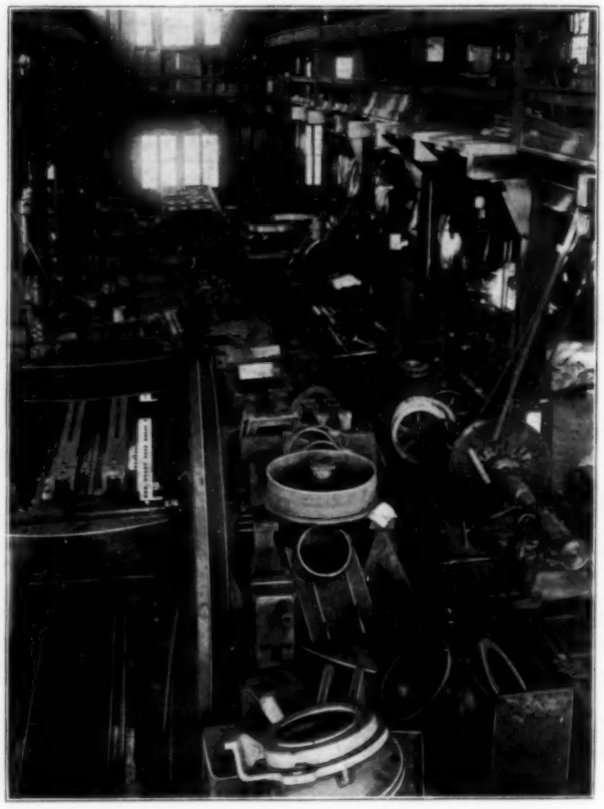


FIG. 2—INTERIOR OF MACHINE SHOP.

in the steel foundry consist of steel castings for locomotives, rolls and pinions, rolling mill castings, machine molded steel gears and castings for general machinery. The capacity of this plant with its present equipment is about 1,000 tons per month. The products in the iron foundry consist of castings for the company's own work, air furnace rolls and pinions, rolling mill castings and general jobbing work. The capacity of this plant is about 750 tons a month. In the machine shops, besides the building of such special machines as belt lacing machines, Wagner cold saw cutting-off machines and diamond prospecting drills, the firm specializes in rolling mills, rolling mill machinery, hydraulic machinery and punches and shears. It has built all kinds of machines and tools from blue prints and specifications, having furnished gas engines, test cutting machines for armor plate, ingot cars, slab cars, riveters, steam hammers, cotton compresses, etc. The firm name has been changed but the company continues to make diamond drilling machines and carries on a business of prospecting, having at

present four crews at work in different portions of the United States.

The demand for belt lacing machines has never been greater since the placing of this machine in the market and there are in service some 3,000 of them.

The demand for the Wagner cold saw cutting-off machines is large and the amount of business this year has already equaled the sales during 1904, the first year the machine was put on the market.

Building continues active all over the country. Official reports to *Construction News* from 20 of the principal cities for April show that permits were taken out for the construction of 9,160 buildings, involving $40,993,888, against 8,577 buildings, involving an aggregate cost of $32,443,068 for the corresponding month a year ago, an increase of 583 buildings and $8,550,820, or 27 percent. To those who are familiar with building operations, this increase is in no sense a surprise, for the reason that it has been foreshadowed by favorable indications for a long time. It is simply maintaining the prosperous aspect of the situation that set in many months ago. From a glance at the figures one is impressed with the fact that operations are on a pretty even basis, for the reason that, comparatively speaking, there are no phenomenal increases or no startling decreases.

Members of the Newark Foundrymen's Association held their annual meeting and banquet at Newark, N. J., May 3. The following officers were elected at the business session: David M. Meeker, president; Frederick L. Eberhardt, vice president; Henry L. Gebhardt, secretary, and George Hannay, treasurer. The 1905 executive committee was named as follows: Arthur E. Barlow, James Flockhart, Louis Sacks, H. W. Inslee and John F. Hewitt. The principal address of the evening was made by George H. Hull, of the American Pig Iron Storage Warrant Association, of New York.

American Institute of Mining Engineers.

WASHINGTON, May 5.—The thirty-fifth annual meeting of the American Institute of Mining Engineers was held in this city this week. A meeting was held in New York City on Feb. 21 for the election of officers, and adjournment was then taken to Washington. The meeting here was called to order by President James Gayley, of New York, who introduced S. F. Emmons, chairman of the local committee, and who in turn presented District Commissioner Macfarland, who made the address of welcome. President Gayley replied and the institute proceeded with the business outlined in the program.

Charles Kirchoff, of New York, made a report of progress on the project for the Carnegie building, which is to be erected in New York City for the use of mechanical, electrical and mining engineers. He announced that the contract for the work of construction would be awarded in the near future. Secretary R. W. Raymond told of the recent incorporation of the institute in order that it might join with the other engineering societies in accepting the tender of Mr. Carnegie to erect the union engineering society building. The difficulties encountered in incorporating a society that had done business for 33 years without being incorporated were referred to with some detail and not without humor. During this session two biographical notices were presented, one a tribute to Sir Lowthian Bell, and the other to Thomas M. Drown, of Lehigh University. Henry M. Howe was author of the first sketch and the second was prepared by Dr. Raymond.

One of the principal features of the second session of the meeting was the presentation of a paper on "The Production and Characteristics of Wrought Iron," by James P. Roe, of Pottstown, Pa., general superintendent of the Glasgow Iron Co., Pottstown, Pa. Mr. Roe gave considerable detail of his own

FIG. 3—VIEW OF IRON FOUNDRY FROM THE CORE SHOP END.

mechanical process of puddling, which it is cleamed greatly increases output and at the same time reduces the necessity for the employment of skilled labor. The paper called out a practical discussion, in the course of which special reference was made to uses for which wrought iron is preferable to steel. Dr. Charles B. Dudley, chemist of the Pennsylvania Railroad Co., Altoona, Pa., gave the results of his investigation of detail fractures and the relation of fibre stress to tensile strength.

Much time was devoted to the discussion of President James Gayley's supplemental paper on the "Application of Dry Air Blast to the Manufacture of Iron." His original paper read at New York in October, 1904, gave rise to much discussion in the technical press both of this country, Great Britain and Germany. On the present occasion Mr. Gayley gave additional data and answered many questions put by interested members of the institute. He not only gave data of results obtained in actual operations after the period covered by his first paper, but also discussed the theoretical side of the questions involved. Some of the most extended discussions of the paper were those presented by Prof. James F. Kemp, of Columbia University, New York, and by S. W. Croxton.

J. E. Johnson Jr., of Longdale, Va., read a paper on "An Automatic Stock Line Recorder for Iron Blast Furnaces." He referred at the outset to the method sometimes adopted to get information of the location and movement of the stock line —stationing a man at the top of a pair of mechanically filled furnaces, simply to watch and gauge them by hand in the old-fashioned way. Another method is that devised and patented by Messrs. McClure and Phillips, of Sharon, Pa. It consists in suspending test rods from ropes leading over pulleys to the ground level, where the ropes are wound on small drums with graduated peripheries and provided with crank handles, whereby the skip man or some other person can quickly and conveniently gauge the position of the stock line in the furnace. Reference was also made to the valuable indications given by the application of the Uehling pyrometer to the downcomer, even though there is no scale for the translation of "top temperatures" into "feet down." Mr. Johnson described an apparatus consisting of the following: A test rod suspended at its top by a chain but normally resting on the stock and descending with it, except when the bell is open; a simple mechanism for lifting this rod out of the way of the incoming stock at the latter period, and an attachment for recording the motion of the rod on a reduced scale. The central off-take pipe for the gas made it easy to locate the test rod so that it would hang vertically almost in the center of the furnace. The test rod is a 1⅛-in. round iron bar about 18 ft. long and it is suspended from a chain passing over a pulley, and a No. 10 wire attached to the chain runs to the ground where the recording mechanism is located. The apparatus was described in detail, as well as the charts and the method of making records. Experience in the use of the device has been most satisfactory.

FIG. 4—MOLDING FLOOR OF THE STEEL PLANT.

Several papers were presented on coal and coke, including one by M. R. Campbell, of Washington, giving a new classification of coals and lignites.

The social features of the meeting were perhaps more elaborate than on any recent occasion and included visits to many points of interest in and around Washington, notably the National Museum, Library of Congress, Ordnance Proving Grounds of the United States Navy at Indian Head, Corcoran Gallery of Art and the gun factory at the United States navy yard. The list of attendants included the following:

Taylor Allerdice, Pittsburg, Pa.; R. Scott Allen, Philadelphia, Pa.; O. B. Amsden, Rovebaix, South Dakota; F. E. Bachman, Port Henry, N. Y.; H. F. Bain, Washington, D. C.; John Birkirbine, Philadelphia, Pa.; A. A. Blow, Washington, D. C.; W. R. Boggs Jr., Argentina, S. A.; A. H. Brooks, Washington, D. C.; M. R. Campbell, Washington, D. C.; R. H. Chapman, Washington, D. C.; Thos. M. Chatard, Washington, D. C.; F. H. Clement, New York City; W. B. Cogswell, Syracuse, N. Y.; Albert L. Colby, New York City; Geo. G.

Crawford, McKeesport, Pa.; S. W. Croxton, Cleveland, O.; N. H. Darton, Washington, D. C.; David T. Day, Washington, D. C.; F. P. Dewey, Washington D. C.; Chas. W. Dickson, Kingston, Canada; Chas. E. Dinkey, Braddock, Pa.; E. V. d'Invilliers, Philadelphia, Pa.; Chas. B. Dudley, Altoona, Pa.; A. Eilers, Brooklyn, N. Y.; S. F. Emmons, Washington, D. C.; David L. L. Eynon, Philadelphia, Pa.; Thomas M. Eynon, Philadelphia, Pa.; George H. Garrey, Washington, D. C.; James Gayley, New York City; M. I. Golman, New York City; U. S. Grant, Evanston, Ill.; Arnold Hague, Washington, D. C.; Anton Hardt, Wellsboro, Pa.; Jos. Hartshorn, Pottstown, Pa.; T. M. Jackman, Clarksburg, W. Va.; J. E. Johnson Jr., Longdale, Va.; W. J. Johnson, New York City; Edward Keller, Baltimore, Md.; C. Kirchhoff, New York City; John Lilly, Lambertville, N. J.; A. F. Lucas, Washington, D. C.; Frank Lyman, New York City; Simon Martin, Sparrows Point, Md.; W. F. Mattes, Scranton, Pa.; Ellison C. Means, Lowmoor, Va.; C. A. Meissner, New York City; G. P. Merrill, Washington, D. C.; Frank Meyer, New York City; Harry H. Miller, New York City; S. C. Miller, Washington, D. C.; Alfred J. Moses, New York City; George Ormrod, Allentown, Pa.; E. W. Parker, Washington, D. C.;

FIG. 5—ROUND NOSE CUTTER FOR DREDGE.

Richard Peters, Philadelphia, Pa.; T. E. Pierce, Syracuse, N. Y.; R. W. Raymond, New York City; W. H. Rea, Pittsburg, Pa.; W. B. Ridgely, Washington, D. C.; Thos. Robins Jr., New York City; Jas. P. Roe, Pottstown, Pa.; F. Z. Schellenberg, Pittsburg, Pa.; Geo. P. Scholl, Philadelphia, Pa.; F. C. Schrader, Washington, D. C.; Mortimer A. Sears, Mineral, Va.; J. M. Sherrerd, Easton, Pa.; Geo. O. Smith, Washington, D. C.; E. A. C. Smith, Baltimore, Md.; J. W. Smith, Syracuse, N. Y.; A. C. Spencer, Washington, D. C.; C. E. Stafford, Chester, Pa.; George Steiger, Washington, D. C.; B. Stevens, Valdez, Alaska; Jos. Struthers, New York City; W. W. Taylor, Clifton Forge, Va.; A. Thies, Charlotte, N. C.; C. H. Thompkins, Plainfield, N. J.; David Townsend, Philadelphia, Pa.; Chas. D. Walcott, Washington, D. C.; W. Irving Walker, Millington, Md.; Wm. R. Webster, Philadelphia, Pa.; Walter H. Weed, Washington, D. C.; S. T. Wellman, Cleveland, O.; O. Wenstrom, Boston, Mass.; E. B. White, Pittsburg, Pa.; Marcus White, Washington, D. C.; N. B. Wittman, Philadelphia, Pa.; F. E. Wright, Washington, D. C.; Cleveland Abbe Jr., Washington, D. C.; Edwin Bukofzer, Woodward, Alabama; Jas. Douglas, New York City; Edouard L. Foucar, Denver, Colorado; J. W. Hoffman, Philadelphia, Pa.; J. A. Holmes, St. Louis, Mo.; C. W. Hayes, Washington, D. C.; R. L. Humphrey, Philadelphia, Pa.; E. S. Jones, Scranton, Pa.; J. F. Kemp, New York City; W. Lindgren, Washington, D. C.; Chas. E. Munroe, Washington, D. C.; H. C. Perkins, Washington, D. C.; Richard Peters Jr., Chester, Pa.; Robert Pitcairn, Pittsburg, Pa.; W. L. Sheafer, Pottsville, Pa.; J. E. Spurr, Washington, D. C.; E. C. Witherby, Syracuse, N. Y.; John Boyt, Sparrows Point, Md.; W. H. Fluker, Thomason, Ga.; Edgar Allen Forbes, New York City; A. W. Fieso, Chicago, Ill.; R. N. Watson, Harrisburg, Pa.; G. F. Becker, Washington, D. C.

American Car & Foundry Co.

The quarterly report of the American Car & Foundry Co. for the three months ended Feb. 28 shows a gain in net earnings of $3,577. There was a balance after allowing for the preferred dividend of $1,100, against a deficit in the same period a year ago of $142,577. The company was enabled to make this showing owing to the passing of the common dividend. Following is the statement:

	1905.	1904.	Increase.
Net earnings	$ 536,000	$ 532,423	$3,577
Div. pfd. stock	525,000	525,000	.....
Balance	$ 11,000	$ 7,423	$3,577
Div. com. stock	.....	150,000	*150,000
Surplus	$ 11,000	Def. $142,577	$153,577
From Sept. 1 to Feb. 28:			
Net earnings	$ 1,075,694	$ 2,093,908	*$1,018,214
Divs. pfd. stock	1,050,000	1,050,000	.....
Balance	$ 25,694	$ 1,043,908	*$1,018,214
Divs. com. stock	.....	300,000	*300,000
Surplus	$ 25,694	$ 743,908	*$718,214
Prev. surplus	11,967,794	11,159,292	808,502
Total surplus	$11,993,488	$11,903,200	$90,288

*Decrease.

Shovels for the Panama Canal.

WASHINGTON, May 8.—The Isthmian Canal Commission last week opened bids for furnishing 12 steam shovels for use on the Panama canal. The Marion Steam Shovel Co., of Marion, Ohio, offers twelve 95-ton steam shovels at $13,065 each, or $156,780 for the twelve. This quotation is for shovels not "knocked down," for which class of machines the commission has expressed a preference. For shovels "knocked down" the Marion company has submitted a bid of $12,715 each, or $152,580 for the lot. In either event delivery will be made on the basis to two shovels in August; two in September; two in October; two in November and two in December. The commission also has the option of ordering twelve additional shovels at the same price if such supplementary contract is made within six months. The Bucyrus Co., South Milwaukee, Wis., offer to furnish twelve 90-ton steam shovels "knocked down" at $143,800, or 12 shovels of the 95-ton type "knocked down" at $151,800. Delivery of two shovels per month is promised. John Souther & Co., of Boston, through Royce & Ricketts, agents, offer shovels f. o. b. Boston, as follows: One cubic yard bucket shovel at $5,000 each, or $60,000 for 12; two cubic yard bucket machines at $6,500 each, or $78,000; three cubic yard machines at $7,500 each, or $90,000; two cubic yard bucket (broad gauge) machines at $5,800 each, or $69,600 for twelve. Shovels to be furnished "knocked down."

The A. G. Cameron Steam Pump Works, of New York, have withdrawn their agency from the Mine & Supply Co. and are now represented by Cary & Fielding, No. 1711 Tremont street, Denver, Col., Utah Mining Machinery & Supply Co., No. 228 South West Temple St., Salt Lake, Utah; Ingersoll-Sergeant Drill Co., El Paso, Texas; Victor M. Braschi & Co., Cadenas street, No. 2, Mexico City, Mexico.

CLEVELAND CLUB OF FOUNDRY FOREMEN.

The first annual banquet of the Cleveland Club of Associated Foundry Foremen was held at the Hotel Euclid, Cleveland, Saturday evening, May 6, and was attended by nearly a hundred members of the club and their friends, including foundry owners, patternmakers and pig iron salesmen. The club has been in existence only a year, but has already accomplished much to advance the interests of the members and their employers. After cigars had been lighted at the completion of the menu, the president of the club, A. L. Hott, of the Interstate Foundry Co., called the meeting to order and after a few words of greeting, introduced secretary W. H. Nicolls, who read an invitation to all connected with the foundry business in Cleveland to attend the annual convention of the American Foundrymen's Association, to be held in New York, June 6, 7 and 8. President Hott presented Mr. H. J. Boggis, of the Boggis-Taylor Co., Cleveland, as the toastmaker of the evening. Mr. Boggis introduced the speakers with a few well chosen words.

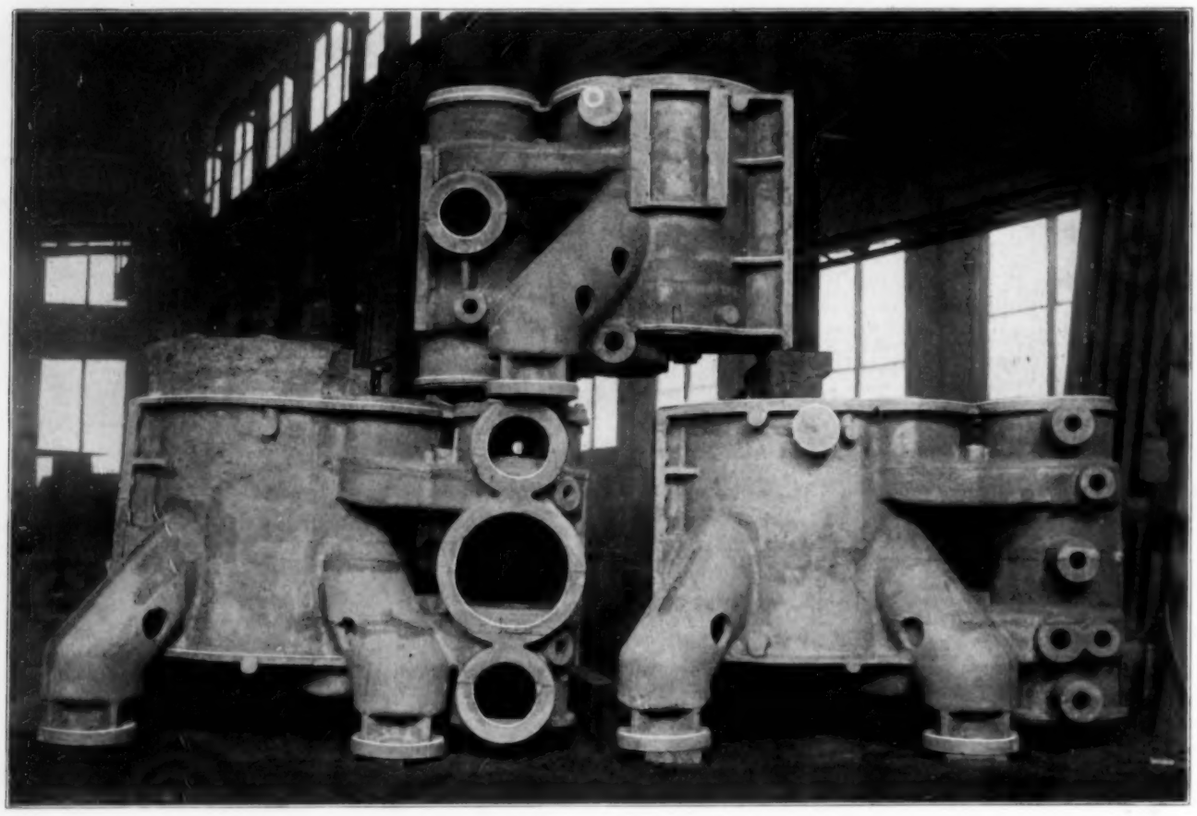


FIG. 6—SET OF MARINE ENGINE CYLINDERS.

Dr. Richard Moldenke responded to the toast "The A. F. A. and Its Work." He extended hearty congratulations to the foundry foremen of Cleveland on the successful inauguration of their club. He said that back of all such efforts in organization lies a dominant idea: the desire for more knowledge: "Let this be in lines social, technical, or financial; we simply must know all we can get hold of in our business; of each other's personality and character, and finally of those great movements of the day, all intimately tied up with finance." He declared that owners should welcome every movement on the part of all of their employes based upon the honest desire to acquire knowledge, for the owners are the chief gainers. The foreman who has arrived at the time when ambition no longer impels him to climb to the next step, the management, and then the acquisition of an interest, will soon be ready for permanent retirement, and in an up-to-date foundry concern quickly lands there. "Long before you expect to enter into ownership, it would pay you to watch the iron and coke markets," said Dr. Moldenke, "and to compare the contracts your firm has with those of others. Much is to be learned of the movement of these fundamental materials of the industry by keeping track of things, especially from the pages of a first-class trade journal. The temptation is always a strong one to charge the highest price to the man who is not posted. Not only should you watch pig iron, scrap and coke, but also the supplies, such as structural steel, sand, cement, etc., for on going into business it is best to do so just before a rise is due. You thus get the lowest figures to buy, and when the plant is up, you can take work at the highest figures of the time, instead of vice versa when you build at the top notch. I advise you to get hold of specialties, to keep the shop a-going, whether times are brisk or dull. There is much comfort in knowing that even if the income is no more than the pay roll, a steadily increasing pile of stock stands ready for the first resumption of good times. Our industry has a wonderful fascination and few that have made castings themselves take to other lines entirely out of the industry. I believe our good friend Sercomb, of Milwaukee, who at last accounts is making soap, still regrets the change, though doubtless he makes more money cleaning humanity. When you take it all into your reflections over a tired year's work, you will agree with me in feeling that our effort is one of constant progress. Next week we expect to know more than we do today, or at any rate should do so. It is this feeling that has led to the formation of foundrymen's associations. It has led to the formation of your own society. It will lead to the formation of others. For the sake of our nation's progress, we wish them all Godspeed, and we try to help them along with good hard work and investigation. Had it not been for the concerted work of our metallurgists in the American Association, we would not be buying nearly all our pig iron under chemical specifications, nor would our better

posted foundry foremen write out mixtures at their desk without worrying how they will turn out.

"I am repeatedly called in on expert work in foundries, and have always found the foremen most anxious to learn the simple little trick of arithmetic by which a mixture can be figured out from the stock piles ,the analyses of which are known. The effect that such calculations have on the buying of the iron is seldom realized by the owner. As just an instance of this, I will quote from my own experience. Where formerly the works in question had all the way from 10,000 up to 17,000 tons of pig iron in stock, as many varieties had to be carried to mix from. After I had mastered the principles involved in the work, that stock was cut down to less than 3,000 tons, and oftentimes I had to worry about the iron due for a week to follow, when delays by rail will occur. Just think of the interest on the former investment saved. How much more could be said on the subject of the foundry and our particular hobbies in it. We get together and think we have threshed it out so dry that nothing worth talking about is left, and behold, when we come together once more, it is—Have you seen this or that shop, and the way they turn out those propeller castings? Or a new instance of how the pattern shop did the foundry that time, or vice versa. If there were not so much new constantly turning up, how could we have such bright trade journals as the *Foundry* and the *Patternmaker?* Our conventions seem to teem with interesting matter, and I take this occasion to extend to each and all of you, as well as all foundry Cleveland, a hearty invitation to join with us in New York City next month, when we hope to have a most interesting gathering of foundrymen from all over the country. May the good work go on here. May you become thoroughly acquainted with each other; learn to value and respect the earnest efforts and good citizenship which will be found in our industry. I greet you again as fellow-foundrymen, on the right road to progress, success, and that prosperity which we all strive for with American pluck, American ability, the American perseverance."

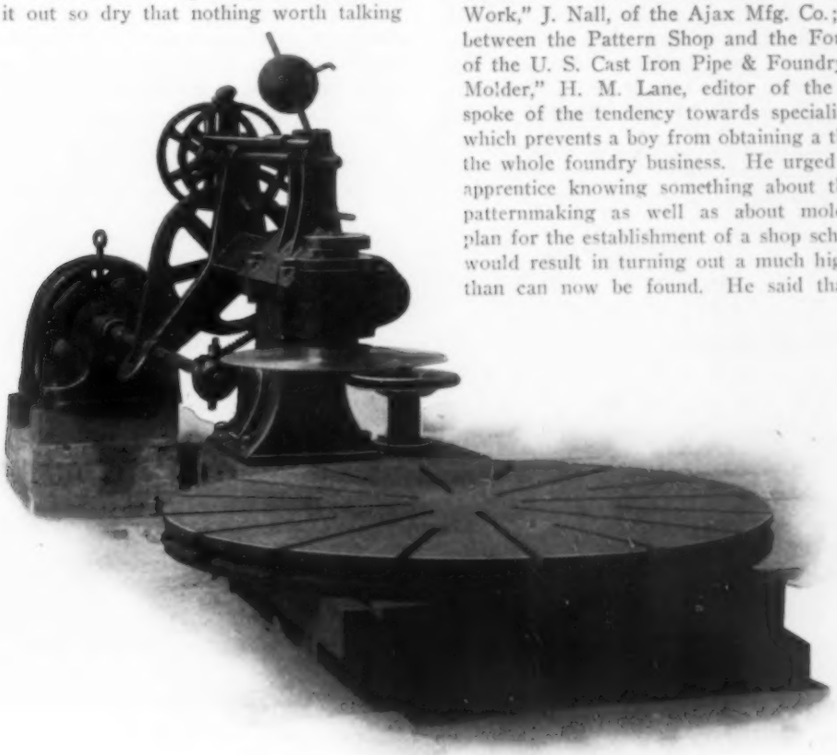


FIG. 7—A WAGNER COLD SAW CUTTING-OFF MACHINE.

John A. Penton, of the Penton Publishing Co., spoke on "Early Reminiscences of the A. F. A." He told of the first meeting in Philadelphia of a few men interested in the foundry business to organize a local association of foundrymen, and how from that small beginning the national organization grew. Mr. Penton made a strong plea for the organization of foundrymen, saying that it is based on the desire of men in the same business to be associated with their fellow men and is absolutely necessary for the highest success in the business world. He said that if a man were not entirely in harmony with the plans and methods of an organization, that was no reason for his refraining from becoming a member. He ought to go into the organization and exert his influence to have it changed to conform to his ideas.

N. S. Calhoun, of the Johnson & Jennings Co., responded to the toast, "Cleveland as a Foundry Center," making a speech abounding in humor and giving the guests a few solid facts on which to reflect. Other speakers were: "Cleveland Club of Associated Patternmaker Foremen, Its Object and Work," J. Nall, of the Ajax Mfg. Co.; "Proper Relationship between the Pattern Shop and the Foundry," Alfred Hibbs, of the U. S. Cast Iron Pipe & Foundry Co., and "Making a Molder," H. M. Lane, editor of the *Foundry*. Mr. Lane spoke of the tendency towards specialization in the foundry which prevents a boy from obtaining a thorough knowledge of the whole foundry business. He urged the importance of an apprentice knowing something about the machine shop and patternmaking as well as about molding, and outlined a plan for the establishment of a shop school, which he believed would result in turning out a much higher grade of molders than can now be found. He said that the product would be a well developed mechanic instead of a man trained in some special feature of the foundry trade.

At the annual meeting of the Tennessee Coal, Iron & Railroad Co., three of the five directors whose terms expired were re-elected. They were: F. S. Witherbee, vice president; James Henry Smith and Herman S. Leroy. John E. Borne, president of the Colonial Trust Co., of New York, and Andrew W. Smith, of New York, were elected to the places of Joseph B. Dickson and Charles McCrery. The annual reports of President Don H. Bacon and Treasurer T. L. Beecher, will be submitted to a meeting of directors May 16.

The Vulcan Iron Works Co., of Toledo, O., has just shipped three more Little Giant steam shovels to South Africa. This company has shipped quite a number of this type of shovel into the diamond fields in the Kimberley district. Five Little Giant shovels are at work in close proximity to the mine in which the largest diamond ever discovered was recently found, and the three shovels just shipped go to this property.

ELECTRIC ORE HANDLING PLANTS.

What are known as the Brown "fast plants" on the Conneaut, O., ore docks of the Pittsburg, Bessemer & Lake Erie railroad consist of four electrical unloaders which were in operation for the greater part of the season of 1904. The main purpose of the installation was to increase economy by lessening hand labor; the consideration of increasing speed, while also important, was secondary to that of labor saving. A cost of about 1 cent a ton for unloading—this covering labor and power—has been attained in the use of these plants. The unloading of 9,306 tons from the steamer Augustus B. Wolvin last season, with a cost for labor in the hold of the boat of $11.25, and a total cost for power and all forms of labor of a little over $100, is a performance noteworthy for its economy.

There are two parts of the electric plant at Conneaut, the whole designed by the Brown Hoisting Machinery Co. and built under the patents of Alex. E. Brown—the fast plants, which take the ore from the vessels and load it into cars or deposit it in a pit under the rear cantilever, when it is handled to the stock piles, and in the second place the bridge, which rehandles the ore from the pit to the storage piles. There are four fast plants placed on the wharf front. They are of the electric man trolley type and are equipped with grab buckets of 10,000 lb. normal capacity. The trolley travel extends over the vessel 49 ft. 5 in. from the center of the front rails, and back over the dock to a point 116 ft. 5 in. from the same center. The total trolley travel is thus 165 ft. 10 in. From end to end of the fast plant is 190 ft. 1 in. The weight of each of the four plants is about 175 tons. Each is carried on 16 truck wheels, making the wheel loads comparatively light. All the wheels are driven by a 75-h. p. motor placed in the motor house above the track and connected with the trucks by shafting, and so geared as to move the plant along the dock at a speed of about 75 ft. a minute. The apron extension over the boat is hinged so that it can be raised and lowered. Four loading tracks are spanned by the machines and there is room for a fifth. Back of the loading track farthest from the vessel is a pit in which the electric conductors are placed; then comes another railroad track and finally a pit of sufficient size to take the largest cargo of ore inside of a vessel length. On account of the shape of the storage area this pit does not extend the full length of the wharf. The electrical machinery for operating the grab bucket and trolley is placed in the trolley and is so mounted that the grab bucket can be rotated to any position desired. For hoisting there are two 150-h. p. motors; for traveling the trolley, one 100-h. p. motor; for rotating the bucket, one 3½-h. p. motor. Running on the track just below the motor house is the trolley in which the operator rides, with his controllers, levers, etc., and he is so located that he can see every motion of the bucket.

The apron hoist and the moving gear for traveling each plant are operated by a motor mechanism placed on the main framework and wired so that the operator can control them from any point along the trolley travel. Each motion of the trolley and crane travel is performed by a separate motor and these can be combined at the will of the operator.

The bridge is of the electric man trolley type and has a trolley travel of 530 ft. 8 in. It is equipped with a grab bucket of 14,000 lb. normal capacity. The bucket is not rotated and the bridge moving gear is operated from two points only, one at the shear and the other at the pier end of the span. The bridge travel, at the rate of 75 ft. per minute, is the same as the travel of the fast plant. The bridge trolley with load travels 1,000 ft. per minute and hoists the bucket and load at the rate of 225 ft. per minute.

The fast plant trolley with load travels 900 ft. per minute and hoists the bucket and load at the rate of 300 ft. per minute. The capacity of the bridge is 250 net tons per hour to the center of the trolley travel on the bridge. The capacity of each fast plant is 210 net tons per hour until 75 percent of the cargo is unloaded, this being done with no hand labor in the hold. For 100 percent of the cargo of a modern boat its capacity is 150 net tons an hour, with sufficient hand labor to bring the ore within reach of the bucket. For short periods the above capacities of bridge and fast plants are exceeded, but the speeds given are from actual records of work. Seven men are employed on the four electrical machines—one foreman, four operators and two oilers. In cleaning up, five men are employed in the hold of the boat.

FIG. 1—FOUR BROWN "FAST PLANTS" WORKING OVER A BOAT AT CONNEAUT, O.

The success of the new steel fire proof baggage car for the Erie railroad is at present a doubtful proposition, the experience during the cold weather last winter being too much for the men employed in it and the car was assigned to carry theatrical baggage and scenery. The car is a handsome affair and the road is considering the advisability of lining it with fireproofing material to make it more habitable. It has not been given a thorough test in hot weather.

FAR-REACHING STEEL TRADE OF SHEFFIELD.

In the second installment of an article on the "Steel Trade of Sheffield," which appears in the engineering supplement of the London *Times* of April 19, Sir Charles McLaren, M. P., discusses as follows the scope of the steel industry of that famous district and the principal outlets for its products. The article is of special interest as the autumn meeting of the Iron and Steel Institute is to be held in Sheffield:

The three principal processes of steel making now used in Sheffield, with the characteristics of each, are as follows:

Huntsman's.—Perfect hemogeneity, but at great cost of money and labor.

Bessemer's.—Expedition in manufacture, but limited as to quantity by the size of the converter, and possessing sometimes uncertainty in respect to homogeneity.

Siemens's.—Approaching nearer to Huntsman's in homogeneity, and capable of being produced in almost any weight up to 100 tons at one operation and in one furnace.

Sheffield has been, and is, the laboratory and workshop of all three processes; but it is the Siemens furnace which now supplies the greatest weight of steel it uses. As the plant of the heavy firms has grown, so have grown the population and wealth of the district. When they were founded in or soon after 1851, the population of Brightside, the city on the Don, was 15,000 out of a total town population of 135,000. The population of the same district in 1901 was 125,000, with an overflow to other parts of the town of at least a further 20,000; and it is still increasing. The ratable value of Brightside, including Attercliffe, in 1851 was £44,000. In 1902 the ratable value was £474,000. The nominal capital of the heavy firms when turned into limited companies in the sixties was about £4,000,000. Many were overcapitalized, and the shares of nearly all during the seventies stood at a heavy discount. The year 1879 was the worst the steel trade had ever seen. Today, with their various extensions and subsidiary interests, the same firms control in share capital, debentures (of which they can issue any reasonable amount at 4 percent or under), and reserves nearly £20,000,000. They employ at Sheffield and elsewhere not less than 70,000 to 80,000 men, and the wages they pay exceed £4,000,000 per annum. The magnitude of their works, which are contiguous to one another in Sheffield and occupy two miles on both sides of the railway, with furnaces and machinery engaged in one occupation, dwarfs the Krupp works at Essen. The annual tonnage passing over the Midland railway sidings from these two miles of works is 1,100,000 tons, a state of things probably unequaled on any other railway. Taking a rough estimate of the destination of these heavy products, the following are the percentages of consumption which Sheffield provides:

Railway material, other than rails used by British, Indian and Colonial railways, 75 percent.

War material made by private firms in this country—viz., guns, gun forgings, shot, shell and steel for small arms—70 percent.

Armor plates for British battleships and cruisers now afloat, 90 percent.

Shafting and steel castings for ocean liners, 60 percent.

Special castings used in modern electrical power and traction plant, such as tramway crossings, magnet castings, etc., 70 percent.

Nearly all the steel for tools and pens made in this country, nearly all the clock and watch spring steel used at home and abroad, and a hundred other things unclassable as steel goods are of Sheffield make.

All these great trades have been built up by the genius and enterprise of Sheffield men with out Government subsidy, often with anything but Government favor. Their pioneers and managers have always been equal to, and have often anticipated, any requirements made upon them. In the course of their existence, the exigencies of supply and demand have compelled the larger firms to extend their undertakings into allied industries. Some have become colliery owners and have acquired iron mines abroad. The three armor plate firms of Vickers, Browns, and Cammells found it to their interest to construct and equip the war vessels for which they made the mostly costly materials, and they are now also shipbuilders at Barrows-in-Furness, Clydebank, and Birkenhead respectively. They have proved their capacity over and over again to undertake any class of vessel our own or any other admiralty may require. Browns are now building for the Cunard company the largest and most powerful ship ever designed, and another which is the largest built in Great Britain. Vickers have sunk many millions of capital in the gun works which have just taken an order for the new field guns for the British army, and the battleship they are building for the Japanese navy will be armed as well as armored by their firm. Firths, who have recently effected a financial amalgamation with Browns, own a shell-making plant in the United States, and have just met the prohibition tariff of Russia by establishing a complete steel-making works at Riga.

FIG. 2—GENERAL VIEW OF BROWN STORAGE BRIDGE AT CONNEAUT, O.

These great developments have not been attained without enormous capital outlay, but those who have found the money have no reason to repent their investment. A summary of the printed balance sheets for the past five years of five principal limited companies having an average capital—ordinary, preference and debenture—for that period of £10,906,300 shows a gross profit of £1,123,950, or about 10 percent per annum; and a similar summary of four principal firms for ten years, with an average capital—ordinary, preference and debenture—of £7,983,800, shows a gross profit of £771,500, also about 10 percent per annum. Against this will, of course, be written debenture interest, preference divi-

dend, and special depreciation of plant. This is not an excessive return considering the nature of the business, but it is at the same time a remuneration which well accounts for the premium at which the various shares stand locally. Apparently both the shareholders, the auditors and the public are satisfied that the plant and machinery are maintained in an efficient and up-to-date condition; and that this has been done out of revenue is clear from the fact that there have been no new capital issues, except for the purposes of acquiring extensions and new branches, such as shipyards, ordnance works, and foreign establishments, to which reference has been made. During Lord Goschen's reign at the admiralty he used pressure on the three armor-making firms to double their capacity of output, which was at that time about 5,000 tons each per annum. They at once responded to his appeal, and spent large sums out of revenue in this direction, which, so far as they are concerned, is wasted money, for the admiralty has never given out orders for armor plate over and above the quantity which the original plant could have turned out. Other companies who do not publish balance sheets appear to have done no less well and stand in equal favor in the local share markets. All these securities are quoted and freely dealt in on the Manchester and Sheffield exchanges, and in some few cases in London.

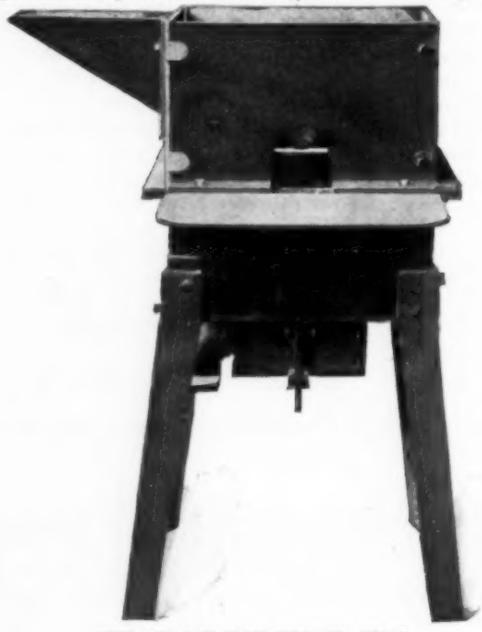
These great firms, however, do not monopolize the heavy steel manufacture of Sheffield. Spacious as is the Don Valley, it would by no means accommodate the whole of those engaged in the steel industry. Scores of other firms exist whose presence elsewhere would call for special comment. The population of the city of Sheffield is something over 400,000, and, great as is the number employed by the Brightside firms, there is a good margin who find work in other parts of the city, and not a few in the steel trade. Many of these firms are more deeply engaged in the old steel trade of the town than the heavy firms of Brightside. Not a few still combine the two processes of steel manufacture by the Huntsman process with that of cutlery manufacture. The other branches of the engineering trade of Sheffield deal chiefly with the production of tools, the makers of which are legion. Sheffield has never been an engine building center. For a long period the old Manchester, Sheffield and Lincolnshire, now part of the Great Central railway, was the only line through Sheffield, and served merely as a feeder to the Great Northern railway. Leeds, as the terminus of the Midland railway and the junction of other railways serving Yorkshire, naturally took the position of engine builder by reason of local requirements. Sheffield is not, however, without firms of high standing in that trade. Messrs. Davy Bros. are erectors of the heaviest mill machinery. The Yorkshire Engine Co. is a locomotive builder, and Messrs. Hawksley, Wild & Co. are boiler makers. These and other less known firms together find employment for hundreds of men, and form in themselves a very important industrial group.

A. P. Head, the London representative of the Wellman-Seaver-Morgan Co., has just completed a tour around the world and has established the following sub-agencies for that company: Australia, Australian Metal Co., Melbourne. The branches of this concern are as follows: New Zealand, Gilbert Machinery Co., Wellington; Queensland, James Stothert, Brisbane; North Queensland, James Croker, Mackay; New South Wales, W. R. Laidley, Sydney; South Australia, James C. Fraser, Adelaide; West Australia, A. E. Thomas, Koolgardie; Tasmania, Lindsay Tullock, Launceton. In India the following agents representing the presidencies of Bombay, Bengal and Madras, have been appointed: J. Harper, Calcutta; Frank Harrison, Bombay; W. H. Oakes, Madras.

Directors of the Pressed Steel Car Co. have declared the regular quarterly dividend of 1¾ percent on preferred stock, payable May 24 to holders of record May 3.

A FLUE HEATING FORGE.

A forge of novel type is being placed on the market by Joseph T. Ryerson & Son, of Chicago. The illustration presents a front view of the forge which is specially adapted to heating flues for welding machines. The forge is very compact and is simple in construction. It affords a long narrow fire which heats the flue only at the proper place for welding and thus involves a very small heat loss. Opposite the flue hole and on the back of the furnace there is a punching bar affording the operator a solid piece to butt the flue against during the heating. This abutment is made with a large head and works on a screw so that it may be adjusted for different lengths of flue pieces, from 6 to 24 inches. To drop the gate



THE RYERSON FLUE HEATING FORGE.

it is only necessary to pull out the tripping bar at the bottom of the blast box. This allows the bottom of the blast box to drop down and with it the grate to which it is hinged.

The Fairest Wheel Works, of Pana, Ill., have closed the contest for a new name for their plant and have accepted the suggestion of Walter Worsham, of Paris, Ill., to call the concern the Progressive Mfg. Co.

The net earnings of the Alabama Consolidated Coal & Iron Co. for January, February and March were $190,986. The total fixed charges, including interest on bonds, dividend on preferred stock and sinking fund for that period were in round figures $55,500, leaving a net surplus of earnings of $135,000. The output has been increased within the past few months, the average output of coal now running to about 14,000 tons a week, and the coke to over 25,000 tons a month. The iron output, likewise, is being increased, and in addition the company is now building another furnace at Gadsden at a cost of $350,000.

Through a typographical error a misstatement concerning the business of the Dodge Coal Storage Co., of Philadelphia, was made in the issue of April 27. The item was intended to say that Dodge & Day, engineers, Philadelphia, who for three years have designed the electrical equipment for operating hoisting and conveying machinery built by the Dodge Coal Storage Co., will have charge of similar work in connection with telpherage apparatus. This will now be manufactured by the Dodge Coal Storage Co., which has acquired the United Telpherage Co.'s interests.

ELECTRIC MOTOR APPLICATION.*

BY ERNEST G. HOWARD.

The design of any electrical power installation must be based on the actual conditions existing in the plant. There are, however, two general plans in use, each of which has its advantages. The first is the individual drive or the application of a separate motor to each machine, the motor, in most cases, being directly mounted on the frame and either belted, geared, chain-driven or coupled to its main shaft. This method eliminates all line or counter shafts and long belts. It insures the most complete control of each machine and the entire stoppage of current consumption when the machine is idle, securing in the highest degree all the advantages and economies to be expected from the installation of an electrical system. This method should be used for all machines, especially large ones located under cranes, and all tools which by the nature of the work stand idle for considerable periods, and is advisable for all machines where the personal element of the workman enters into the output, which includes nearly all variable speed machines.

The second plan is known as group driving, by which is meant the assembling or grouping of several machines and operating each group by a motor through a short line of shafting, each machine being belted to its counter in the usual manner. At first glance it would appear that many of the advantages to be expected from the electric drive, such as absence of belting, complete individual control of each machine, cessation of power supply when machine is idle, etc., were lost, at least in part, under this latter plan. The fact is that in many cases this is the most efficient and economical. When a large number of small automatic, or semi-automatic, machines are to be driven, if they are so grouped that all in the group can be kept going practically all the time, the loss in friction of shafting and counters will be much less than the loss when the small motor is necessary to drive each machine individually; moreover, in this type of machinery the speed is usually constant and the personal element of the workman is absent. Again, there are some classes of high speed machinery that require more power to start than to actually do the work. By grouping such machines they may be driven satisfactorily by one motor of from 40 to 50 percent of the total capacity of the group. The first cost is not only much less in the group drive, but the plant efficiency in both of the above cases is considerably higher than it would be with a motor on each machine.

The greatest advantage of a motor system is its flexibility, inasmuch as there is hardly a shop or factory where frequent changes are not made, either by installing additional apparatus or re-locating existing machines. When such machines are motor driven, however, it is more economical to change the wiring circuits supplying such machines than to relocate and lay out a new line of shafting with its numerous attachments.

In many cases the power is conveyed to machines in a remote part of the building, or even to machines located in a separate building, by means of shafts and belts or rope transmission, consuming far more power continually than is actually used by the machines which they are intended to drive. The use of electric motors obviates these losses. Machinery used in the preparation of raw material in many plants is required to run only a small percentage of the working day; the line shafts and long belts are constantly in operation for driving them. Under these conditions the electric drive is an essential feature, as it may be shut down and all operating cost stopped when not actually employed.

When a plant is engine-driven it is almost impossible to ascertain whether the machinery is working at its best, or developing undue friction loads, but if motor driven it is an easy matter to determine by the use of electrical measuring instruments the amount of power consumed by each and every machine, and if increases are detected these troubles can be remedied at once. This is a particularly valuable feature in electric driving, as it is a correct check on current consumption, especially in shops running on piece work, where the abuse of machinery by piece workers is often encountered.

Some three years ago the Chapman Valve Mfg. Co. decided to make extensions to its plant, but one of the first questions was the matter of power. As the steam plant was not only old and evidently overloaded but incapable of further extension, it was decided to equip the new buildings electrically. The next question with which we were confronted was how much power would be required in the extension. This was easily solved. Inasmuch as a number of motors were to be purchased they were ordered in various sizes and accurate tests made to determine the actual power required. These tests were carried out in such a manner that when this building was completed each drive had its proper size of motor and no motors were left on our hands. An electric traveling crane was also installed in this building, with its runway projecting out of the building and over the railroad tracks.

At this time it might be well to cite a comparative test of loading large valves with the traveling crane, as against the old method. The result of loading two 48-in. valves by the old method showed that it required a yard gang of ten men, no end of skids, blocking, tackle and a pair of horses nearly one day, roughly figured an expense of about $20. After the introduction of the traveling crane another test was made on two 48-in. valves; the loading was accomplished in 12 minutes with three men and a current consumption of less than 3 cents worth.

The successes and economies shown by the introduction of the electric drive in this shop were so apparent that the management could not help but consider the equipment of the entire plant, doing away with the steam engine. The old plant consisted of three main shafts running the entire length of each floor of a three story building, this building being divided into nine distinct shops. After going over the conditions very carefully it was decided to put in the system of group driving, and the shops on the top floor were the first to be cut away from the main drive and equipped with motors.

There being no mechanical method by which tests could be accurately made in these shops the amount of power required for the first shop was estimated and a motor of that size purchased. The motor was bolted to the floor and belted in a temporary manner to a line shaft uncoupled from the main shaft. Tests were made, the amount of power accurately determined and a motor ordered for that drive; tests of this sort were continued over these shops, followed up by the connection of motors to the line shaft as fast as they were delivered. In time the whole factory was changed from steam to electrical drive without the shutting down of any part of the plant even for one moment.

All of the group driving is done through the Morse silent chain, the motors being bolted to special iron castings bolted to the timbers. In addition to the various group drives a great many of the larger tools, such as planers and boring mills, were changed from mechanical to direct connection to the motor. The main engine was next taken out, making room for the 85-h. p. direct connected air compressor, motor generator set and switchboard.

The lighting had been obtained from the local lighting company but in making these changes it was deemed advisable to manufacture our own current, which is done through a motor generator set and distributed over the plant buildings by a three-wire system, the mains for the lighting being run out of doors rather than through the buildings where numerous belts, shafts and pipes would be encountered. Tap circuits are taken off so that each shop has a service of its own, all

*Extracts from a paper read before the Connecticut Valley Metal Trades Association meeting at Springfield, Mass., May 1. Various applications of electric motors in the driving of machinery were shown by the use of lantern slides. Mr. Howard is electrical engineer with the Chapman Valve Mfg. Co., of Indian Orchard, Mass.

cut-outs being located at a central distributing point in that shop and so arranged that should a fuse go out an attendant can immediately replace it, as he should have with him a blue print showing exactly the size of fuse that should replace the one burned out and, in this way, lights that go out from various causes can be gotten to burn again in a very short time.

It might be of interest to mention the whistle system used in connection with the branch exchange telephone service. A number of one-inch whistles, with solenoid magnets attached, are distributed throughout the plant and connected to the lighting circuit. Should a long distance call come in for the manager or superintendent and the operator could not reach him at his office, she would, by pressing a button on the switchboard the required number of times blow his telephone number on all the whistles in the plant, and the man wanted would step to the nearest phone and immediately get in touch with his party without loss of time. These whistles are also used as signals by the superintendent for calling some heads of departments should he want them in a hurry, and in connection with the large steam whistle morning, noon and night.

Beside the numerous small portable motors with flexible shafts, breast drill motors, etc., the equipment consists of 52 motors 5 to 85 h. p., 4 traveling cranes, 600 incandescent lights and 60 arcs, the entire current for these being obtained from the United Electric Light Co., from the Indian Orchard plant, over a pole line of about three-quarters of a mile.

The limited time in which the writer had to prepare this paper eliminated any possibility of compiling figures.

The purpose for which the writer associated himself with the Chapman Valve Mfg. Co., however, was not to equip the plant electrically, but to develop and place on the market a line of electrically operated valves. The ever increasing magnitude of the power plants, now being constructed throughout the world, necessitates the most modern and up-to-date engineering practice. In such constructions the importance of the valve is frequently lost sight of, or regarded as a secondary consideration, whereas it is one of the most important appurtenances of a modern installation.

This development practically solves the problem of the rapid handling of large gate valves, under ordinary conditions and especially in cases of emergency. In the designing of such apparatus, the conditions governing the application of the electric motor to the valve were found to differ entirely from the application to all other machinery, inasmuch as the travel is, of course, limited to the size of the valve opening. The problem presented was rather difficult and overcome by the use of a motor especially designed for the purpose, and a lost motion device, enabling it to attain practically a runaway speed, as it is series wound. On account of its peculiar winding, the motor exerts the great torque, at the same time striking a hammer blow which is bound to unseat the valve, no matter how tightly closed. In addition, automatic indicating and controlling devices, no matter how remote, make electrically operated valves indispensable. Valves of this class are especially suited for water, steam and oil lines, and for low pressure work, such as exhaust and condenser piping, pump suctions and discharge sewage, irrigation systems, blast furnaces, etc. They are also extensively used on the receiver piping of compound and triple expansion engines, and are rapidly coming into use as throttle valves on steam turbine units.

The Chapman gate valves are of the double faced, solid wedge, plug type, and have a straight-way passage the full diameter of the connecting pipe. This is the simplest and strongest design for the purpose. It requires the smallest number of working parts, and offers the least resistance to the passage of the fluid.

[Photographs were shown of electric valves. Among them a 48-in. exhaust steam valve, operated by a 3-h. p. motor; the valve weighing approximately 8 tons; a 24-in. valve now in service at the Boston Edison Co.'s third station, a total of 17 electric valves being installed in this company's plants; and a 54-in. valve, weighing 10 tons, operated by a 5 h. p. motor. On test this valve required the services of four men for 30 minutes to open it by hand, where it only required one kilowatt and four minutes time with the motor. This valve is installed as the main exhaust at one of the stations of the International Street Railway Co., Buffalo.]

IMPORTS AND EXPORTS FOR MARCH.

The statistics of imports and exports of iron and steel for March and the nine months ending with March, as compiled by the Department of Commerce and Labor, show that the exports of articles on which tonnage is reported were almost the same for March, 1904, and March, 1905, the increase being only 546 tons. Comparing March, 1905, with the preceding month, there is an increase of 19,455 tons, due principally to larger exports of steel rails, sheets, wire and wire nails. The tonnage table follows:

EXPORTS OF IRON AND STEEL FROM THE UNITED STATES—GROSS TONS.

	March		9 mos. end'g Mch.	
	1904	1905	1904	1905
Pig iron	3,954	3,281	27,037	35,665
Scrap	1,937	443	11,010	17,369
Bar iron	3,058	2,862	14,019	23,795
Wire rods	3,035	742	11,961	13,142
Steel bars	1,095	2,692	11,066	19,251
Billets, ingots and blooms	36,908	24,124	85,090	189,742
Hoop, band or scroll iron	515	150	2,110	2,542
Iron rails	584	44	1,324	75
Steel rails	17,873	24,885	57,862	339,831
Iron sheets and plates	173	359	3,981	3,449
Steel sheets and plates	2,724	7,591	11,015	48,578
Tin plates, terne plates and taggers' tin	502	208	830	5,442
Structural material	1,843	5,194	12,814	51,936
Wire	11,327	12,448	81,373	85,512
Cut nails	698	455	7,494	5,861
Wire nails	2,962	3,691	24,678	26,518
Other nails, including tacks	204	619	1,801	2,833
Total	89,332	89,878	365,465	871,541

The value of exports of iron and steel, not including ore, but including articles on which tonnage is not reported, was, for March, $12,446,800, against $10,633,720 in the same month of 1904; for the nine months ending with March, $98,005,188 in 1905 and $78,519,803 in 1904. The exports of ore were 40 tons in March, against 30 in the same month of 1904. For the nine months, the ore exports were 208,194 in 1905 and 75,415 in 1904.

The imports of iron and steel articles on which tonnage is reported were 25,817 tons in March, against 29,450 tons in February, and 28,765 tons in March, 1904. The tonnage table follows:

IMPORTS OF IRON AND STEEL TO THE UNITED STATES—GROSS TONS.

	March		9 mos. ending Mch.	
	1904	1905	1904	1905
Pig iron	12,400	14,388	174,176	69,514
Scrap	2,498	1,452	23,675	8,586
Bar iron	1,222	1,414	25,470	17,643
Iron and steel rails	1,135	361	33,729	8,357
Hoop, band or scroll	18	.....	1,596	1,584
Steel ingots, slabs, billets or bars	1,146	681	89,859	7,047
Sheets and plates	610	305	9,598	1,660
Tin and terne plates	6,060	5,521	37,197	54,502
Wire rods	784	910	14,235	10,728
Wire and wire articles	513	516	4,015	2,834
Structural shapes	1,770	269	12,697	2,140
Total	28,765	25,817	426,047	184,595

The value of imports included in the table and of others of which tonnage is not reported was: March, 1905, $1,929,892; March, 1904, $1,894,650; for the nine months, $16,273,796 in 1905 and $21,341,908 in 1904. The iron ore imports in March were 71,553 tons, against 22,655 tons for March, 1904; for the nine months, 495,185 tons in 1905 and 601,052 in 1904.

The Paris, Ill., Commercial Club is reported as having offered the Big Four a bonus of $100,000 to defray the cost of moving the company's shops from Mattoon to Paris.

THE EASTERN MACHINERY MARKET.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., May 8.

The machinery market in this vicinity during April was not as active as in March. While there is much testimony to this effect, it is said that it is coupled with the statement that March was the best month the general run of machinery merchants have had in two years. While the past month showed a slight falling off it nevertheless gave a good account of itself.

In some quarters there is a tendency to cavil with existing business conditions. While reports from the West would indicate that machinery men in that section are enjoying prosperous trade, there are those who contend that trade is just the reverse here. This is due in a great measure to the spring market not opening up as well as was expected. There is no doubt that there is some excellent business in sight, but it doesn't crystalize into orders as rapidly as it was looked for. A representative of the machine tool trade said: "Business is not what it promised to be a few weeks ago. It was thought that the good trade that was done in March would be followed by still better trade in April, but this did not come to pass. When in Cincinnati recently I heard no complaints expressed about business, and the trade there could not understand why machine tool men in New York were not entirely pleased with the way things were going. But the fact is, people are not buying. I cannot understand why, for general business is good, collections were never better, there seems to be plenty of money, and there are more projects up now, calling for the use of machinery, than has been known in years. But still we don't get the orders."

There is no doubt that railroad orders for machine tools are a little backward. Outside of some good specifications from the Pennsylvania and Erie roads, nothing has developed recently of any consequence. Some good items that made their appearance several weeks ago are being taken care of on the piece-meal plan, and the "street" is really getting used to seeing large propositions go this way.

All of the business in machine tools during the past month was in small lots. There is no change in prices as far as we can learn. From the standpoint of inquiry, the month was good.

In engines and boilers conditions were not as satisfactory as they were during March. The trade recently has run to small orders. Rarely does a prospective order go above 750 h. p. In fact, that is high, the demand nowadays being from 300 to 500 h. p. There is a fair amount of business in sight. In boilers current orders are invariably for small units.

In electrical equipment March business was only fair. There is an immense amount of new construction work to be done, which will mean some excellent orders for electrical machinery manufacturers, but progress has not been made to the extent where orders can be closed. Now that all danger from May Day labor troubles seems to have been passed, building delays are expected to disappear.

In power transmitting machinery April business was quite satisfactory. Manufacturers of wood-working machinery speak in a similar strain concerning their April experiences. In machinists, engineers, railway and contractors' supplies, April was a good month.

Export machinery trade continues satisfactory. Machine tool men booked some fair orders last month with the prospect of a better trade in the near future.

The Niles-Bement-Pond Co., which is now located at its new offices at 111 Broadway, did a satisfactory trade during April. The business recently done has been mostly confined to small lots. The company takes an optimistic view of the outlook.

The Prentiss Tool & Supply Co. regards any recent setback in the trade as of no special significance.

James McCabe reports a falling off in his trade for April, and finds prospective buyers inclined to hold off for the time being.

The Vandyck Churchill Co., 8 Dey street, has recently secured a number of orders for Colborn boring mills, including a 34-in., 44-in. and 60-in., from the Otis Elevator Co., of Yonkers; a 35-in. mill from the New York Edison Co.; a 34-in. mill from the Pratt Institute, and a 44-in. mill from the Atlantic Coast Line. The company notes that last month's business was very satisfactory, both in its New York and Philadelphia stores, and the outlook for the spring is very satisfactory.

Hill, Clarke & Co. have no fault to find with the orders they took in April. They take exception to any statement that trade in machine tools has been unsatisfactory recently.

The American Woodworking Machinery Co., while noting a slight recession in trade for April refer to March as the best they had since 1903. They find general conditions in their line satisfactory.

The Crocker-Wheeler Co. report inquiries very gratifying, and expect to close some good deals in the near future.

Thayer & Co. report that April steam boiler business was fairly good. They look for increased activity in their line ere long.

The A. & F. Brown Co. and the George V. Cresson Co. both found power transmission trade in April about the same as March. The former reports new business as a result of removals much lighter this May than a year ago at this time.

The Ingersoll-Sergeant Drill Co. and the Rand Drill Co. report that general business conditions in their respective lines during April were satisfactory, with the outlook bright.

Trade Publications.

The Colburn Machine Tool Co., of Franklin, Pa., describes in Bulletin No. 21 its 30-in. vertical boring and turning mill. This tool was recently discussed in some detail in the columns of *The Iron Trade Review*.

The machine tools—lathes, crank planers, drill presses, etc.—made with the benefit of the 40 years' experience of P. Blaisdell & Co., of Worcester, Mass., are attractively displayed in a recent catalogue. The firm has been engaged in the one line of manufacture since its inception, a fact that is in itself an impressive testimonial. The ingenious telegraph code given in the catalogue suggests the propriety of machine tool manufacturers in particular getting together on codes. A common arrangement would have manifest advantages and for that matter would lead to some economy in the purchase of one rather than a set of code books.

Hydraulic rams of special type are given prominence in a booklet from the Columbia Engineering Works of Portland, Oregon. These rams are made in a variety of sizes and the description of their capacities and construction is presented with a number of tables and other useful information.

The pamphlet on thermit steel for welding has been improved with some additions by the Goldschmidt Thermit Co., of New York. The pamphlet is thorough in its presentation of the essential steps in successful work with thermit. Tables showing the amount of material and dimensions of molds for effective welding are given and there are several illuming illustrations of molds and results.

A neat pamphlet on corrugated bars for reinforced concrete comes from the St. Louis Expanded Metal Fireproofing Co., of St. Louis, Mo. The book is of convenient size for desk and pocket, has numerous tables and formulae relative to concrete work and there is a lavish display of views illustrative of concrete usefulness for many purposes.

The J. I. Case Co., of Racine, Wis., has started a train of 25 cars of machinery to its branch house at Dallas, Tex. Opportunity to inspect the machinery will be given at points along the route and the train, which is accompanied by a steam calliope, will run only during the daytime.

DRY AIR BLAST IN IRON MANUFACTURE.*

BY JAMES GAYLEY.

It is to be regretted that the data respecting the use of dry-air blast, which was presented to the Iron and Steel Institute at its meeting in the United States in October, 1904, should have been restricted to the period from Aug. 25 to Sept. 9 inclusive, and from Sept. 17 to 30 inclusive. In order to present the paper at all it was found necessary to limit the record of operations to the period above stated. In the discussion of the paper it would appear from the conclusions of some participating therein, that they have been placed at some disadvantage in considering the economies obtained through the use of dry-air blast, by reason of the data covering such a short period. It is the purpose of this communication to present in detail the record of operations of the Isabella furnaces from November, 1904, to March, 1905, inclusive, as shown by the furnace records.

The month of October, 1904, is not included, as the furnace using dry-air blast was stopped several times for repairs, and while the record was a very good one considering these interruptions, yet it was not a continuous one.

The record for furnace No. 1 using dry-air blast, and the comparison with furnace No. 3 using natural air for the month of November, 1904, is set forth in Table I.

TABLE I.—*Comparison of Records of Furnace No. 1 Using Dry Air Blast and Furnace No. 3 Using Natural Air Blast, November, 1904.*

Year 1904.	Grains of Moisture.				Temperature.				Gas Analysis.	
	In Atmosphere.		In Dry Blast.		Atmosphere.		Dry Blast.			
	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	CO.	CO_2.
Nov. 1....	2.53	2.74	1.15	1.05	51	47	20	17	25.8	12.6
2....	2.82	2.75	1.10	1.02	50	50	18	16	25.6	12.2
3....	2.64	2.59	1.05	1.01	47	45	16	16	23.6	14.0
4....	2.18	2.44	1.06	1.07	52	50	16	19	23.0	15.0
5....	2.58	1.98	1.13	1.01	54	44	17	19	.....	.....
6....	1.69	1.79	0.94	1.06	45	44	15	19	.....	.....
7....	1.86	2.35	1.05	1.04	43	41	17	20	22.8	14.0
8....	2.42	2.43	1.04	1.04	45	44	20	20	.....	.....
9....	2.30	2.39	1.09	1.02	46	42	19	19	.....	.....
10....	2.52	2.49	1.07	1.05	44	45	19	20	.....	14.0
11....	1.69	1.68	1.00	1.04	44	39	18	20	.....	.....
12....	1.50	1.73	1.07	1.02	42	47	20	22	.....	.....
13....	1.88	1.79	1.04	1.00	43	44	21	22	.....	.....
14....	1.56	1.59	1.04	0.95	44	41	20	21	23.8	13.8
15....	1.89	1.91	1.07	1.06	45	45	20	22	.....	.....
16....	2.01	1.91	1.11	1.02	49	39	20	21	20.6	13.0
17....	1.74	1.85	1.01	1.05	41	39	18	22	.....	.....
18....	2.04	2.25	1.13	1.09	48	48	21	22	23.4	14.0
19....	2.24	2.35	1.10	1.09	48	50	21	22	.....	.....
20....	2.74	3.03	1.16	1.04	59	59	22	20	.....	.....
21....	1.96	1.85	0.98	0.96	52	39	18	20	23.2	16.0
22....	2.06	2.02	1.05	1.03	43	40	20	20	.....	.....
23....	2.21	2.18	1.03	1.01	44	51	20	21	24.0	12.0
24....	2.43	1.81	1.07	1.00	48	44	21	21	.....	.....
25....	1.62	1.32	0.94	0.99	43	44	22	21	24.8	12.0
26....	1.49	1.43	0.98	1.01	39	35	20	21	.....	.....
27....	1.01	0.90	0.93	0.81	33	29	19	17	.....	.....
28....	0.88	1.02	0.81	0.83	31	37	18	18	22.6	15.0
29....	2.33	2.30	1.07	1.03	56	49	21	20	.....	.....
30....	1.05	1.00	0.81	0.82	37	33	17	18	23.0	15.0
Average..	1.99	1.99	1.03	1.01	46	43	19	20	23.5	13.8

The record of operation is as follows:

	Ave. Daily Product Tons (2,240 lb.)	Ave. Coke Consum'n Pounds	Blowing Engines Rev. per Min.	Ave. Temp. Hot Blast Deg. Fht.
No. 1 furnace, dry air...	447	1,816	96	854
No. 3 furnace, natural air	386	2,279	111	750

By a reference to my former paper it will be noted that the month of November is the beginning in this country of the winter period, when the atmosphere decreases rapidly in humidity. The month of October being the transition month in the autumn and April in the spring, and furnaces using natural air approach more closely, from November on, to the conditions obtained by the use of dry-air blast. The data given in Table I with reference to grains of moisture and temperature, represents the average for the day of observations taken hourly during the period indicated. The temperature of the dry blast is from observations taken at the top of refrigerating chamber, but this temperature is increased in the passage of air from the refrigerating chamber to the blowing engines.

Table II shows the record of operations for the month of December, 1904, in which it is interesting to note the decrease in moisture as compared with November. In November the average moisture was 1.99 grains, while in December it was 1.45 grains, the maximum variation, however, being from 0.55 to 3.91 grains. There is also a slight reduction in the grains of moisture in the dry air.

TABLE II.—*Record of Operations During December, 1904.*

Year 1904.	Moisture.				Temperature.				Gas Analysis.	
	In Atmosphere.		In Dry Blast.		Atmosphere.		Dry Blast.			
	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	CO.	CO_2.
	Grains.	Grains.	Grains.	Grains.	Degrees Fahrenheit.					
Dec. 1...	1.13	1.37	0.98	1.07	35	36	20	21	23.4	13.6
2....	1.41	1.56	1.08	0.97	38	37	20	20	.....	.....
3....	1.56	1.46	1.01	0.96	35	34	20	20	.....	.....
4....	1.26	1.30	0.99	0.97	33	29	19	19	23.0	14.0
5....	1.34	1.39	0.97	0.98	31	36	18	20	23.0	14.0
6....	1.28	1.50	1.00	1.00	35	36	20	20	25.0	12.0
7....	1.70	1.67	1.10	0.99	39	40	20	20	.....	.....
8....	1.31	1.20	1.09	0.95	41	34	20	19	22.6	14.8
9....	1.12	1.11	0.93	0.85	32	29	18	18	24.8	14.4
10....	0.91	0.55	0.76	0.52	25	15	16	11	24.4	14.0
11....	0.55	0.80	0.43	0.44	15	23	7	10	.....	.....
12....	1.26	1.37	0.85	0.94	30	30	17	19	24.4	12.8
13....	1.04	0.83	0.93	0.64	29	23	18	14	23.0	13.6
14....	0.73	0.64	0.67	0.53	22	13	12	9	24.0	14.0
15....	0.74	0.78	0.53	0.56	22	20	8	10	.....	.....
16....	0.79	0.99	0.72	0.70	20	21	10	11	23.0	15.0
17....	1.39	1.65	0.79	1.02	29	34	14	20	.....	.....
18....	1.37	1.72	1.00	1.06	32	32	19	20	.....	.....
19....	1.81	1.35	1.11	0.96	35	31	21	18	22.3	15.0
20....	1.29	1.31	1.02	1.04	31	34	18	19	22.8	13.4
21....	1.34	1.27	1.07	1.00	31	30	19	18	22.4	13.6
22....	1.23	1.91	1.10	1.08	35	49	19	20	22.6	14.4
23....	2.44	3.50	1.35	1.54	53	53	23	27	.....	.....
24....	2.15	1.71	1.18	0.94	40	35	21	18	23.1	13.2
25....	2.19	2.31	0.96	1.03	37	38	17	19	.....	.....
26....	2.37	3.06	1.11	1.25	41	46	19	22	.....	.....
27....	3.91	2.23	1.41	1.11	58	48	24	21	.....	.....
28....	0.68	0.72	0.74	0.60	25	21	15	13	24.7	13.3
29....	0.82	0.94	0.67	0.69	25	29	13	13	24.2	13.0
30....	1.04	1.26	0.82	0.91	38	43	15	16	24.8	13.6
31....	1.55	2.22	0.96	1.11	47	51	19	22	.....	.....
Average..	1.41	1.47	0.94	0.92	34	33	17	18	23.5	13.8

The air conduit pipe for the refrigerating chamber to blowing engine room was constructed to connect with four blowing engines, and as only three engines were used on furnace No. 1, it was decided to connect the fourth engine with the dry-air conduit and apply it to furnace No. 3, thus making on No. 3 two engines with natural air and one engine with dry air. The comparison of the work of furnaces Nos. 1 and 3 and the effect of one-third of the engine revolutions supplying dry air to No. 3 furnace is shown as follows:

	Ave. Daily Product Gr. Tons	Ave. Coke Consum'n Pounds	Blowing Engines R.P.M.	Av. Temp Hot Bl'st Deg. Fht.
No. 1 furnace (dry blast).....	455	1,823	96	877
No. 3 furnace:				
Dec. 1-22 (normal blast).....	400	2,309	111	785
Dec. 23-31 (1-3 dry blast)...	461	2,140	111	785

Although one-third of the engine revolutions supplied dry air, yet the weight of dry air was slightly in excess of one-third the total quantity, by reason of the air being denser.

The results shown by the use of such a small quantity of dry air is remarkable, and is greater than was experienced when first applying the dry air to furnace No. 1 in August. The application of one-third of the engine revolutions with dry air increased the weight of air delivered to the furnace, and at the same time the average temperature of hot blast increased 20 degrees. The furnace at once began to drive more rapidly and the burden was also increased. There was no deterioration in the grade of metal produced, in fact it was slightly bet-

*Data supplementing Mr. Gayley's paper of Oct. 26, 1904, before the New York meeting of the Iron and Steel Institute. The supplemental paper here presented was read at the Washington meeting of the American Institute of Mining Engineers, May 3, 1905.

ter, as the silicon was higher and sulphur lower than in the preceding part of the month.

In Table III is set forth the record for January, 1905, wherein is found a further reduction in the humidity of the atmosphere.

TABLE III.—*Record of Operations Ending January, 1905.*

Year 1905.	Moisture. In Atmosphere.		Moisture. In Dry Blast.		Temperature. Atmosphere.		Temperature. Dry Blast.		Gas Analysis.	
	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	CO.	CO_2.
	Grains.	Grains.	Grains.	Grains.	Degrees Fahrenheit.					
Jan. 1...	2.61	2.75	1.19	1.14	53	51	22	20	.....	.....
2...	3.31	2.19	1.34	0.82	52	41	21	15	.....	.....
3...	0.98	0.52	0.50	0.45	27	18	9	9	24.8	13.0
4...	0.70	0.78	0.58	0.57	20	22	10	10	24.3	13.2
5...	1.09	1.34	0.73	0.78	29	33	13	14	23.0	14.2
6...	1.85	1.96	0.94	0.80	33	35	16	16	24.0	13.0
7...	1.49	1.19	0.81	0.68	32	29	15	14	23.4	13.0
8...	1.00	0.89	0.71	0.70	26	23	13	12	.....	.....
9...	0.97	1.72	0.69	0.84	25	31	12	15	.....	.....
10...	0.61	0.90	0.58	0.48	21	23	10	7	.....	.....
11...	1.65	2.89	0.96	0.81	31	45	9	12	.....	.....
12...	3.05	1.51	1.00	0.66	48	37	15	11	.....	.....
13...	1.00	0.86	0.68	0.48	31	27	10	8	.....	.....
14...	0.53	0.65	0.49	0.49	17	20	7	8	.....	.....
15...	0.77	0.63	0.59	0.45	24	19	9	7	.....	.....
16...	0.85	0.95	0.61	0.53	23	28	10	10	.....	.....
17...	1.08	1.23	0.65	0.64	31	34	12	12	.....	.....
18...	1.31	1.33	0.75	0.69	36	41	12	13	22.8	14.2
19...	2.05	1.96	0.86	0.86	42	42	15	16	.....	.....
20...	1.67	1.65	0.78	0.64	42	36	13	11	22.6	14.0
21...	1.87	2.15	0.76	0.75	40	39	12	13	.....	.....
22...	1.43	0.79	0.77	0.48	35	25	13	9	.....	.....
23...	0.85	1.20	0.56	0.57	22	26	9	11	23.8	13.8
24...	1.44	0.97	0.64	0.51	29	23	12	9	.....	.....
25...	0.67	0.42	0.45	0.35	19	12	7	4	23.0	12.8
26...	0.47	0.69	0.38	0.42	15	17	5	6	22.2	13.0
27...	0.94	1.18	0.46	0.53	24	30	7	7	23.8	13.5
28...	0.69	0.38	0.59	0.27	23	9	8	2	22.6	14.8
29...	0.47	0.53	0.28	0.36	10	18	—1	3	.....	.....
30...	0.72	0.72	0.41	0.37	18	15	3	3	23.4	13.6
31...	0.99	1.22	0.50	0.55	22	28	5	8	23.3	13.7
Average..	1.26	1.23	0.67	0.60	29	28	11	10	23.3	13.5

On Jan. 10 the dry blast was charged from furnace No. 1 to furnace No. 3. Both furnaces were making the same grade of iron for use in the basic open-hearth process. In the exhibit below no account is taken of the period from the 11th to 14th inclusive, as this period was occupied in adjusting the dry blast and burden on both furnaces. The record of the burden on each furnace shows as follows:

	Weight of Coke in Charge Pounds	Weight of Ore in Charge Pounds
No. 1 furnace:		
January 1-10 (dry blast).....	10,200	24,000
January 15-31 (normal blast).....	10,200	20,200
No. 3 furnace:		
January 1-10 (normal blast) (extra coke in charge).....	10,200	20,200
Jan. 15-31 (dry blast).....	10,200	23,600

During the period from Jan. 1 to 10, when No. 3 furnace was on normal blast, there was charged with the regular burden a small quantity of extra coke. This was taken off when the furnace was changed to dry blast, which would make the burden with dry blast for No. 3 furnace correspond with No. 1 furnace with dry blast. The result on each furnace, before and after the change in blast had been made, is as follows:

	Av. Daily Product Gr.Tons	Av. Coke Consum'n Pounds	Blow'g Engines R.P.M.	Av.Temp. Hot Bl'st Deg.Fht.
No. 1 furnace:				
Jan. 1-10 (dry blast).....	428	2,078	96	869
Jan. 15-31 (normal blast)....	414	2,340	111	771
No. 3 furnace:				
Jan. 1-10 (normal blast).....	410	2,351	111	716
Jan. 15-31 (dry blast).....	432	1,811	96	802

The ore mixture on furnace No. 3 gave a yield in iron 1 percent greater than the mixture on furnace No. 1. The purpose in changing the dry blast furnace No. 1 to No. 3 was to determine the economy on another furnace at a time which represented in that locality nearly the minimum of humidity in the atmosphere, the extreme variations being from 0.38 to 3.31 grains, with a monthly average of 1.25 grains of moisture per cu. ft. of air. The response to the application of dry-air blast was prompt, and efficient in result, and clearly demonstrated that even at periods when the humidity of the atmosphere was relatively low, substantial economy in fuel could be obtained. As already pointed out, an important advantage obtains by keeping the moisture in the air more uniform. Although the atmosphere is much more humid in the summer than in the winter months, yet in the latter the percentage of variation is much greater. A comparison of the average humidity of the several months of the year is misleading as to the effect of such humidity on the operations of a furnace, since such average results do not take into account the wide fluctuations from day to day, and even in the same day. During the past winter in the Pittsburg district, and generally throughout the northern States, there has prevailed a protracted cold season, and since the beginning of our observations there has been no winter season showing a lower average of humidity than the one just ended; therefore any demonstration under these conditions of the efficiency of dry-air blast, in comparison with a furnace using normal blast, is made at a time when the furnace operated with normal blast is at its highest efficiency.

It has been thought by some that the use of dry-air blast might be dispensed with in the winter months, when the content of moisture in the atmosphere is very low. There could scarcely be a month more favorable to the study of the effect of dry air than that presented in the month of February, 1905, where the average of moisture is 1.19 grains for the daytime, and 1.17 grains for the night, with a maximum variation of 0.30 to 2.57 grains of moisture per cu. ft. of air. In Table IV is shown the record for that month, and it will be noted that during several days the average moisture content of the atmosphere is lower than the average for the month in the dry blast.

TABLE IV.—*Record of Operations During February, 1905.*

Year 1905.	Grains of Moisture. In Atmosphere		Grains of Moisture. In Dry Blast.		Temperature. Atmosphere.		Temperature. Dry Blast.		Gas Analysis.	
	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	CO.	CO_2.
Feb. 1...	1.33	0.73	0.71	0.47	30	21	10	7	23.6	13.4
2...	0.39	0.30	0.35	0.18	13	7	3	—1	.....	.....
3...	0.48	0.29	0.31	0.22	9	9	1	1	23.8	13.4
4...	0.58	0.49	0.39	0.28	16	14	3	4	.....	.....
5...	0.73	1.64	0.41	0.63	20	31	6	11	.....	.....
6...	1.66	0.79	0.71	0.49	34	23	13	7	24.0	13.0
7...	0.69	0.67	0.51	0.35	23	16	7	3	.....	.....
8...	0.79	2.27	0.42	1.80	26	39	4	14	23.6	14.0
9...	2.57	1.67	0.95	0.78	43	37	16	13	23.4	14.0
10...	1.02	0.61	0.83	0.46	30	20	13	17	.....	.....
11...	0.60	1.04	0.36	0.52	18	30	6	9	.....	.....
12...	2.25	2.01	0.87	0.81	37	37	12	13	.....	.....
13...	0.72	0.40	0.64	0.28	20	9	9	2	24.6	13.4
14...	0.40	0.71	0.37	0.35	8	21	0	5	.....	.....
15...	0.45	0.22	0.48	0.24	16	9	3	2	.....	.....
16...	0.53	0.73	0.35	0.33	15	27	2	4	23.6	12.2
17...	1.04	0.84	0.61	0.48	33	27	9	6	24.0	14.2
18...	0.73	0.68	0.55	0.39	25	24	6	4	.....	.....
19...	0.87	1.15	0.51	0.69	27	32	5	9	.....	.....
20...	1.98	2.06	0.86	0.97	39	41	12	13	.....	.....
21...	1.56	2.11	0.71	0.88	38	37	14	10	25.6	12.4
22...	2.37	2.01	1.02	0.86	40	38	12	10	.....	.....
23...	1.86	1.69	1.11	0.74	28	36	13	9	24.0	14.0
24...	1.70	1.65	0.88	0.70	37	32	9	8	22.0	15.0
25...	1.77	2.10	0.91	0.88	34	40	10	10	.....	.....
26...	1.48	0.91	0.90	0.43	38	28	13	5	.....	.....
27...	0.97	1.34	0.70	0.53	29	35	8	10	.....	.....
28...	1.74	1.40	0.62	0.59	40	37	8	7	25.6	12.2
Average..	1.19	1.17	0.65	0.54	28	27	8	8	23.9	13.4

As already pointed out the benefits derivable from the use of dry air can be directed in the main to increase of production, or to decrease in coke consumption, or to both purposes. In the month of February, by reason of the dry atmosphere and the large volume of air on furnace No. 1, the operations at furnace No. 3 were directed principally toward economy in coke. The output on furnace No. 3 is less than on No. 1, as the former was stopped several times during the month on account of break downs of slag machine, and breakouts of iron at the hearth. Notwithstanding the low content of moisture in the normal blast and representing conditions rarely obtained

in that district, the furnace supplied with dry blast made, considering the stops, practically as much iron—with a consumption of coke 433 lb. less per ton of iron—as the furnace supplied with normal blast. As the summer season approaches the product of the furnace using normal blast will steadily decrease and the fuel increase, while the work of the furnace supplied with dry air will continue practically uniform. It is doubtful if a better illustration can be had than that offered by the month of February in demonstrating the value of maintaining the blast practically uniform as to dryness.

The record of operations is as follows:

	Av. Daily Product Gr. Tons	Av. Coke Consum'n Pounds	Blowing Engines R.P.M.	Av. Temp. Hot Bl'st Deg. Fht.
No. 1 furnace (normal blast)...	424	2,248	111	800
No. 3 furnace (dry blast).....	412	1,815	96	784

As will be seen by Table V the advent of the spring months makes a material increase in the moisture. The operations in March were seriously interrupted by reason of high water in the Allegheny river, which flooded the works, and caused a shut-down of several days. On account of this shut-down extra charges of fuel were added to both furnaces. On starting the plant, furnace No. 3, supplied with dry air, responded more quickly, and reached the normal grade of iron in one day, while it required three days to obtain like results on furnace No. 1. The record for the month is set forth in Table V.

TABLE V.—*Record of Operations During March, 1905.*

Year 1905.	Grains of Moisture.				Temperature.				Gas Analysis.	
	In Atmosphere		In Dry Blast.		Atmosphere.		Dry Blast.			
	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	CO.	CO_2
Mch. 1...	1.77	0.78	0.90	0.52	37	27	13	5	.....	.....
2...	0.78	1.00	0.55	0.44	29	30	4	7	.....	.....
3...	1.81	2.06	0.74	0.59	37	42	9	10	.....	.....
4...	1.98	1.16	0.91	0.42	44	31	13	8	.....	.....
5...	1.60	1.69	0.74	0.69	39	40	11	12	.....	.....
6...	1.24	1.44	0.75	0.62	38	38	10	10	23.5	14.0
7...	2.28	3.29	0.90	1.04	41	47	13	14	.....	.....
8...	2.73	1.61	1.07	0.68	44	33	15	9	.....	.....
9...	1.73	2.19	0.68	0.83	35	41	9	12	.....	.....
10...	1.94	1.20	0.88	0.60	43	32	14	10	.....	.....
11...	1.37	1.52	0.75	0.75	39	36	12	11	.....	.....
12...	1.33	1.09	0.74	0.54	40	32	11	9	.....	.....
13...	1.00	1.16	0.71	0.64	35	34	10	12	.....	.....
14...	1.22	1.32	0.81	0.57	36	33	12	10	.....	.....
15...	1.64	1.85	0.85	0.84	39	38	10	13	.....	.....
16...	2.47	2.74	1.11	1.12	49	52	15	18	.....	.....
17...	2.64	2.74	1.21	1.12	54	53	18	18	23.9	13.5
18...	2.85	3.84	1.31	1.38	64	65	21	24	.....	.....
19...	4.80	4.08	1.65	1.54	60	61	24	23	.....	.....
20 } 21 } 22 }	Furnace banked on account of high water.									
23...	2.61	2.95	0.81	1.08	52	56	10	15	.....	.....
24...	3.32	3.08	1.32	1.15	58	51	21	16	.....	.....
25...	2.69	2.73	1.29	1.09	60	54	18	16	.....	.....
26...	3.19	2.93	1.20	1.11	58	58	17	16	.....	.....
27...	2.34	2.58	1.26	1.19	64	64	18	17	.....	.....
28...	2.92	4.04	1.29	1.42	66	63	18	21	.....	.....
29...	3.08	3.16	1.34	1.27	68	68	21	23	.....	.....
30...	3.30	2.18	1.42	0.88	59	49	22	16	.....	.....
31...	2.23	2.39	1.21	1.01	57	55	17	15	.....	.....
Average..	2.25	2.25	1.01	0.89	48	45	14	14	23.7	13.7

The record of operations for the month is as follows:

	Av. Daily Product Gr. Tons	Av. Coke Consum'n Pounds	Blowing Engines R.P.M.	Av. Temp. Hot Bl'st Deg. Fht.
No. 1 furnace (normal blast)...	411	2,274	111	850
No. 3 furnace (dry blast).....	405	1,837	96	784

The product on No. 3 furnace is a little less than on furnace No. 1, but No. 3 was banked nearly one day longer than No. 1, which would more than make up the difference.

In the discussion of my paper presented to the Institute in October, 1904, I note a comparison of the Isabella with the Edgar Thomson furnaces, without due regard being given to the different conditions existing at these plants. During the period covered in this communication the Edgar Thomson furnaces worked with a mixture of ores yielding 55.5 percent of iron, while the Isabella mixture yielded but 51.5 percent of iron—and in addition the stoves at the Edgar Thomson gave a temperature from 200 to 300 degrees higher than at the Isabella. The results achieved by the use of dry blast have been from furnaces that might properly be designated as old furnaces; they have been banked several times, which invariably has a deteriorating effect, and the coke used was an inferior grade from the Connellsville region, and used altogether on furnaces making basic iron.

The data presented in this communication are the furnace records entire for the points covered, and in considering them it is important to bear in mind that comparisons made with the dry blast are under atmospheric conditions, when furnaces operated with normal blast are doing their best work.

DISCUSSION.

Several members submitted data bearing on Mr. Gayley's paper. One contribution that went most at length into the subject was presented by T. W. Robinson, of Chicago, first vice president of the Illinois Steel Co. It is given in full below:

Comments by T. W. Robinson.

The international discussion that has been evoked by Mr. Gayley's latest contribution to the annals of iron and steel is a striking testimonial to the value of his paper. If the figures given can be considered typical of what may be reasonably expected from the use of the dry blast, its innovation is bound to prove of the greatest importance. That the problems of cause and effect are intensely interesting, both from their commercial and scientific aspects, is reflected in the widespread interest that has been evinced. Those questioning the sincerity of the Isabella test or the accuracies of recording the results, will not be considered by those acquainted with Mr. Gayley or his past work. As to the causes for results so at variance with accepted ideas, the discussion has brought out little that is convincing. It is strange that greater stress has not been placed on what Mr. Gayley himself has had to offer in way of explanation. Stated briefly, his reasons for the higher efficiency obtained are greater uniformity of practice and ability to reduce the heat reserve. The essence, of course, of the Isabella demonstration is that the furnace, working under as strictly comparative conditions as could be devised, showed a saving of approximately 400 lb. of coke per ton of iron through the substitution of dry blast for ordinary blast. The natural inference was that this result must be directly due to the saving of the heat ordinarily dissipated by the usual introduction of the moisture. Calculation, however, shows that the heat units involved in the evaporation and dissociation of the moisture removed by refrigeration represent less than one-fourth of the amount of the fuel actually saved.

How can such an anomaly be explained? In studying this question one naturally looks, first, to the conditions under which the test was made. We have Mr. Gayley's assurance that every care was exercised to make the conditions under which the furnace was operated strictly comparative. The records at Isabella, which were thrown upon to inspection, verified this fact. Raw material, equipment and general practice were shown to be practically constant during the test. The only appreciable variable was the character of the blast. Mr. Gayley's paper covered an operation of one furnace for only about six weeks, during which the fuel was reduced approximately 400 lb. It has been questioned whether so short a test might not easily lead to erroneous conclusions. Fortunately for the advocates of the dry blast process, further experiments at Isabella have corroborated the initial returns. Since the paper was presented the writer has examined the records of four consecutive months on dry blast at the two adjacent Isabella stacks. During this period both were operated under practically identical conditions save that one was run with dry blast and the other with ordinary blast. The dry blast furnace showed an average coke consumption of 437 lb. per ton of iron less than the other. To make the experiment more

conclusive the blast on the two stacks was interchanged, the one formerly on dry air being put on ordinary air and vice versa, the practice otherwise remaining the same. In less than a week the furnaces had exchanged places in production and fuel consumption. This further demonstrated that any differences that might have existed in plant and practice were not of much consequence. The logical conclusion is that the refrigeration of the blast must, in some manner, be accountable for the surprising results obtained.

The problem, accordingly, resolves itself—(1) into a study of the effect of the refrigerating process on the character of the blast itself and (2) of the influence of the dry blast on the furnace reaction.

Refrigeration, as carried out at Isabella, eliminated about three-quarters of the normal moisture and materially increased the density of the blast at the blowing tubs. The fuel directly saved by the elimination of the moisture, as based upon Mr. Gayley's figures of 69 lb. of water removed per ton of iron, is equivalent to less than 80 lb. of coke. If we add to this the saving incident to the increased temperature of the blast there is still a large part of the total saving unexplained.

But what effect has the increased density? The records show that where formerly the engines were making 114 revolutions, the refrigerating of the blast necessitated a reduction to 96 revolutions. If, to be conservative, we assume the ordinary temperature of the air to be 75 degrees F. and that of the refrigerated blast, as it enters the blowing tubs, to be 22 degrees F., and allow the refrigerated blast to have an increased pressure of 0.3 oz., due to the use of the auxiliary fan, we find that the actual weight of the air used per unit of time is in the ratio of 100 to 93.6. In other words: By slowing down the engines from 114 revolutions to 96 revolutions, there was a reduction of a little over 6 percent in actual weight of air blown. In volume the reduction at the blowing tubs amounted to 15.8 percent. This, however, under equal furnace pressure, would have been reduced to a difference in volume of 6 percent at the tuyeres, had the stoves heated the air, in each case, to a like temperature. While weight and volume did not correspond at the engines, they would have done so at the furnaces had the stove capacity been sufficient. That the stoves did not, in each instance, heat the blast to the same temperature is merely incidental and not essential to the case in point.

Accordingly, as increasing the density at the blowing tubs does not, in itself, change the volume of air, or the weight of air, or the weight of oxygen that enters the furnace, if compensated for by lower engine-speed, its only appreciable effect is to increase the engine efficiency. The more dense the air, the greater the weight that can be blown per revolution, that is all. Hence it is clear that the increased density of blast, due to refrigeration, cannot rationally be offered as a cause for the decreased coke-consumption. Further, the only practical result in cutting the revolutions from 114 to 96 was to reduce the blast from 10,000 cu. ft. per minute to about 37,400 cu. ft. per minute. This is a comparatively small reduction and one, of course, capable of attainment without the intervention of refrigerating machinery.

Mr. Gayley says, that by reducing the revolutions from 114 to 96 the volume of blast was reduced 6,000 cu. ft. per minute. He cites this fact in calling attention to the influence that the increased density of the air had upon the steam economy. His statement is correct, but liable to misconstruction unless the material difference in the relation of weight and volume in ordinary and refrigerated temperatures is appreciated. They are, of course, not comparable.

As usually calculated by piston displacement, the difference in the dry and the ordinary blast that entered the furnace was 2,600 cu. ft., not 6,000 cu. ft. Apparently, then, neither increased density nor reduction of blast could explain the balance of the fuel still unaccounted for.

Turning now to the effect of the dry blast on the furnace, we know that its introduction was quickly followed by increased production and decreased fuel-consumption. Analyzing the details, it is perceived that the furnace on dry blast ran with lower top temperature, with an increased percent of carbonic acid in the waste gases, with a less amount of air per unit of coke and with lower pressure of blast. The differences are indicative of lower fuel and are the results of less coke-consumption, not causes for it. We note that the iron produced is more uniform in analysis; that there is less slipping of the furnace; that the flue dust has been reduced from 5 percent to 1 percent and that, generally, the dry blast-furnace is more regular in its operation than the other. In studying the possible causes for fuel saving, it has been shown that the difference existing in plant and raw material had no appreciable effect. The influence of increased density and decreased revolutions of engines was practically negative. Allowance for the heat-equivalent of the eliminated moisture and for the increased temperature of blast does not explain the results that were obtained. One point, however, that has not yet been discussed is, the greater regularity of the dry-blast furnace. That greater regularity ought to follow refrigeration will be apparent, if the large amount of moisture usually introduced is appreciated and the extent of its hourly and daily variations fully realized. If anyone questions this, let him consider what the effect would be of injecting at the tuyere a stream of water under a 40-ft. head that varies from 0.75 to 1.5 in. in diameter. This is practically what a humidity varying from 2 to 6 grains per cu. ft. means, when 40,000 cu. ft. of air is used per minute, even though introduced as superheated steam.

By reducing the moisture two-thirds or more, and by causing the residue to become nearly constant, the refrigerative process cannot help but have an important effect upon regular work.

Now it may be considered axiomatic that under any given condition of raw material and equipment minimum fuel will accompany maximum regularity. It is no uncommon occurrence to see a difference of 400 lb. of coke per ton of iron follow the swinging of a furnace from uniform to irregular work. Ordinarily irregular work is a direct sequence to scaffolding, even though it be embryonic. As to the cause of scaffolding—its name is legion. Lack of uniformity in any of the elements of blast-furnace practice is conducive to a changeable zone of fusion and to accretion. A change of 50° F. in stove temperature will often raise the pressure and sometimes cause more serious trouble. Largely to the extreme variation of moisture in the outer air and in the engine-room is, undoubtedly, attributable the fact that there is not a greater difference in fuel between summer and winter. A compilation of the average monthly results for ten years, of eight furnaces at South Chicago, shows that for June, July and August there was an increased fuel-consumption of but 21 lb. of coke per ton of iron over the winter months. As these furnaces were working, during this long period, under conditions that were practically comparative, the result is of more than ordinary interest on account of so many variables being minimized. The possibility of maintaining more uniform conditions through protecting the in-coming blast from steam contamination, appears worthy of more careful consideration than is ordinarily given.

The blast furnace is an exceedingly rough piece of mechanism, but, withal, a most delicately poised apparatus, when working under greatest efficiency. When normal, its chemical and physical laws are subject to reasonably accurate deductions; but, unfortunately, its regular condition is one of irregularity. This is paradoxical, but just here lies the main reason why Mr. Gayley is obtaining something in practice that theory does not fully explain. From a laboratory standpoint, the reactions involved in iron smelting are simple and well understood. As actually encountered in the furnace they are exceedingly complex and difficult to measure—especially so when there is irregularity.

The question of removing the moisture from the blast is, of

course, an old story. Many have considered the subject and discarded it as an unfeasible proposition, not only for want of a proper method, but from failing to recognize its latent possibilities upon more uniform practice. Twenty years ago the writer was cognizant of comparative tests simultaneously made by James Gayley, E. C. Potter and F. A. Emmerton, at Pittsburg, Chicago, and Joliet, upon the humidity of the air and its effect upon the furnace. That, after so long a study, Mr. Gayley has been able to make the Isabella demonstration, despite practical and scientific discouragement, is a fitting climax to his persistency and ingenuity. Theoretically, the end did not warrant the means. But in iron smelting theory has had to be remodeled many times to square with actual results. Numerous reasons and hypotheses have been advanced in the past to prove why it would be impossible to obtain certain ultimates in coke and product, which were later achieved and surpassed, and history repeats itself. The essential reason for the more effective work that followed the replacing of old-time methods by scientific management was the ability to command more uniform conditions. In later years the evolution of furnace practice has proceeded along divergent lines. On the one hand, more perfect mechanical appliances and a better understanding of the principles involved have tended to greater uniformity and lower fuel. On the other hand, much larger units, heavier blowing and, in this country, the advent of the finer ores from the Mesabi range, have promoted irregularity and higher fuel.

Because the Isabella furnace was consuming 2,147 lb. of coke before the dry blast was applied, the question has been raised whether the subsequent saving of 421 lb. is not misleading, on account of being based on poor practice. Those who know the facts are aware that 2,150 lb. of coke per ton of iron more nearly represents the average practice to-day in the United States, than 1,900 lb. or any less. It is self-evident that a furnace consuming 1,900 lb. would not present the same opportunity for reduction as would one using 2,147 lb. But the opinion that the Isabella practice was poor is neither warranted by the conditions that existed nor by the results that are generally being obtained in this country. Whether the Isabella results can be considered a fair index of what the dry blast would accomplish elsewhere will depend upon individual conditions. It is certain, however, that the refrigeration process will ordinarily pay a handsome return on the investment, and indications now point to its being widely introduced.

As to the influence of heat reserve, to which Mr. Gayley calls attention, every practical furnace man knows how exceedingly difficult it is to measure correctly the actual reserve that is being carried at any given time. In the Isabella case an examination of the records shows that, during the four or five months of cold-blast practice, whatever reserve was carried lay rather in the burden than in the stoves. As the amount of reserve heat is best measured by the analysis of the iron that is being produced, it is significant that during the period mentioned the iron from the furnace with ordinary blast was no hotter than that from the furnace with dry blast. There was more variation in the percentage of silicon, but the average indicated that the maximum possible burden was being maintained on one as on the other. Accordingly, while the question of heat reserve might be an important one, the evidence fails to show that it was much of a factor in the Isabella test.

From what has gone before, the logical conclusion is, that greater regularity superinduced by refrigeration is largely the cause of the extraordinary results at Isabella. This may not be capable of scientific demonstration, but, until the usual reactions of the blast furnace can be more accurately measured, I am content to rest rather upon actual results and rational conclusions than upon scientific deductions that are antagonistic to facts.

Discussion by Joseph W. Richards.

Another contribution to the discussion, which was presented in print at the Washington meeting, was by Joseph W. Richards, of South Bethlehem, Pa. Mr. Richards contrasted the working of the furnace with and without dry blast, analyzing the data presented in the original paper with a view to finding the items in the great and unexpected economy obtained by Mr. Gayley. At the outset he said:

"To state the case in its simplest terms, all that could have been predicted was: (1) that the removal of the moisture from the blast would result in the saving of the heat required for its decomposition, representing from 3 to 5 percent of the heat-value of the coke used; hence about that quantity of fuel might be saved; (2) that the furnace would be somewhat more independent of variations in the weather; (3) that the campaign would be a little hotter; and (4) that the speed of the blowing engines would be decreased, at least in amount proportionate to the reduction in temperature of the air led to them. I do not think anyone anticipated a much larger output per day. The results actually attained were: (1) the furnace made an increase of 24.86 percent in the output of pig iron per day; (2) it consumed 19.6 percent less coke per ton of pig iron made; (3) the blowing engines were run 15.8 percent slower; and (4) the saving in power made up for the power required to run the refrigerating plant. In addition, the blast was hotter; the waste gases cooler, because of their smaller volume; and there was a greater proportion of carbon dioxide to carbon monoxide in the waste gases, showing a better utilization of the carbon in the furnace."

Taking up in detail the items of saving by dry blast, the writer goes at length into the economy in heat requirements, shows that of the total saving effected less than 15 percent is directly attributable to the absence of moisture in the blast; the other 85 percent being due to indirect influences, viz.: (1) the heat in the waste gases is less because the waste gases are less in amount and therefore pass out cooled to a lower temperature; (2) the radiation loss is reduced because the furnace smelts faster, and these losses are in actual amount proportional to the time rather than to the amount of material smelted; and (3) the carbon is consumed better because there is much less dioxide generated and therefore there is less excess of carbonic oxide left unused in the waste gases. The author then argues that the drying of the blast is the exact equivalent of extra heating of the blast, both in its immediate and its ultimate effects, but with the additional benefit of increasing the regularity of the temperature, smelting power and general running of the furnace. A table is presented comparing the heat generated at the tuyeres using moist blast and using dry blast, and a further table showing the net heat in the gases before the tuyeres, using moist blast, the view of the author being that the whole question of economy centers about a discussion of the generation of the heat necessary for smelting in the region of the tuyeres.

Mr. Richards' main deductions are thus stated in the concluding portions of his contribution:

"The gaseous products of combustion using dry blast have 23.4 percent more of their heat utilizable per unit of time for smelting purposes, and have an additional relative heat potential of 5.6 percent to assist in imparting this heat more quickly, making a total relative smelting capacity of $123.4 \times 1.056 = 130.3$ to 100, or 30.3 percent increase if the quantity of oxygen blown in per unit of time were constant. But, since the quantity of oxygen actually blown in per day in Mr. Gayley's experiment was as 100 for moist blast to 96.3 for dry blast, the rapidity of smelting should have been as 100 to $130.3 \times 96.3 = 100$ to 125.5, or a daily increase of 25.5 percent.

"I conclude that since Mr. Gayley obtained an increase of 24.86 percent the views here advanced give a satisfactory explanation of the increased smelting power of the furnace—that the heat saved by absence of moisture is directly utilized for increased smelting capacity, aided furthermore by a higher heat potential which of itself alone would increase the smelt-

ing rate about 5 percent, the two factors working simultaneously and necessarily interdependently toward the total effect.

"In conclusion it may be said that the increased efficiency obtained by Mr. Gayley could theoretically have been obtained by an increased temperature of blast alone, viz., by using the moist blast at 597 degrees C. (1,107 degrees F.), instead of at 382 degrees C. (720 degrees F.). Such increase would produce the effects of quicker running and economizing coke to the quantity noted with dry blast, but would still leave the furnace subject to the irregularities inseparable from using ordinary air with its varying temperature and content of moisture. The increased regularity of running of the furnace and quality of product, due to uniform temperature of air supplied to the blowing engine and uniform temperature before the tuyeres, is the fundamental economic justification for Mr. Gayley's innovation: the increased rate of driving and economy of fuel alone could be obtained more cheaply by increasing the capacity of the stoves."

CANADIAN INDUSTRIES.

TORONTO, CANADA, May 9.—The Consolidated Lake Superior Corporation, of Sault Ste. Marie, Ont., has paid the six months' interest of $50,000 on the $2,000,000 guaranteed by the Ontario government on the first instant. A statement covering the nine months ending with March last shows gross earnings of $6,597,942; operating expenses, $3,256,305; net earnings, $3,341,637 as against net earnings of $2,580,199 for the same period last year. N. W. Rowell, one of the directors representing the Ontario government, now in Europe, has left his resignation in the hands of President Warren, in case it should be asked for by the present administration, but so far has not been demanded. The company is making large shipments of steel rails to Fort William for the Canadian Pacific Railway, the rails being of the standard 80-lb. grade. Several cargoes are now being unloaded containing enough rails for 80 miles of track and heavy shipments will continue throughout the season.

Numerous new industries are being established. The Pease Furnace Co. has applied for a building permit for a foundry building south of the C. P. R. tracks in the western section of Toronto to cost $25,000. The Toronto Gas & Gasoline Engine Co. proposes to erect a plant on the east side of Dufferin, near King street, at a cost of $15,000. The Canadian General Electric Co. has purchased a large block of land at Peterborough in addition to the 30 acres it now occupies there, and will make large additions to their buildings this season. The Peterborough Lock Co. have decided on the construction of new buildings on an extensive scale.

The following companies have been incorporated:

The Canadian Mfg. Co., Ltd., under Dominion law, head office Montreal, capital $40,000; to manufacture plant machinery, etc.; incorporators, Lazarus Rubenstein, Andrew D. Gall, Edward Goodwill, Henry Ward and Henry J. Elliott.

Canadian Scale Co., Ltd, under Dominion laws, head office Montreal, capital $20,000; incorporators, Clarence Backer and Robert Osgood, of Boston; Louis A. Wheeler, Geo. D. Fyfe and J. A. Ewing, Montreal.

R. Watt Machine Works, Ltd., under Ontario law, head office Ridgetown, Ont., capital $50,000; provisional directors, Richard Watt, Wm. J. Taylor, Cecil R. Gammage, James L. Baird and Daniel Watt, all of Ridgetown.

Smith Stacker & Feeder Co., Ltd., under Ontario law, head office Hamilton; capital $40,000; to manufacture agricultural implements, etc.; provisional directors, Harry W. Smith, Martin F. Smith Jr., and John P. Stanton.

Fairgrieve Mfg. Co., Ltd., under Ontario law, head office Toronto; capital $40,000; to manufacture galvanized and enamelled metal work and generally to manufacture and deal in metals and machinery; provisional directors, Thomas S. Baker, Harold W. MacMahon and Wm. F. Godfrey.

Daw-Wadge Implement Co., Ltd., under Manitoba law, head office Winnipeg, capital $100,000; to manufacture farm implements; incorporators, Daniel Daw, of Grand Forks; Thos. Wadge, F. B Blanchard, John A. Waugh and E. E. Sharpe, all of Winnipeg.

FOREIGN IRON AND STEEL NOTES.

The British blast furnace statistics for the quarter ending March 31, show that the number in blast was 339, out of a total of 533. The increase over the number in blast Dec. 31 was 15. The number of furnaces blown out in the quarter was 5. There are under construction in Great Britain at present 7 furnaces, and the number being rebuilt or relined is 49. New furnaces are under construction at the plants of the following companies: Frodingham Iron & Steel Co., Ltd., Frodingham, Lincolnshire; Carnforth Hematite Iron Co., Ltd., Carnforth, Lancashire; T. & I. Bradley, Ltd., Bilston, Staffordshire, South; Bolckow, Vaughan & Co., Ltd., Middlesbrough; Lowmoor Co., Ltd., Lowmoor, Yorkshire; Parkgate Iron & Steel Co., Ltd., Rotherham, Yorkshire, W. R. (2).

Robert Matthews, of the firm of Sir W. G. Armstrong, Whitworth & Co., Ltd., Openshaw, has been elected president of the Manchester Association of Engineers. Mr. Matthews joined the association in 1884, and has been a member of the council for some years. He is in charge of the engineering branch of Armstrong, Whitworth & Co.'s works, and is a member of the Institution of Mechanical Engineers, and of the Committee for the Standardization of Screw Threads.

The death occurred recently of the eminent German metallurgist, Professor Bruno Kerl, age 81. He was professor of metallurgy at the Clausthal School of Mines, and subsequently at the Berlin School of Mines, and was the author of a number of metallurgical works. His first book, on the smelting processes of the Upper Hartz, was published in 1852. His treatise on metallurgy was translated into English by Sir. W. Crookes and E. Röhrig in 1868.

Turbines for ships are manufactured by Parsons & Co., at the Turbinia Works, Wallsend; but there is at Heaton, Newcastle, a second factory where land turbines are made, chiefly for electrical purposes. The land turbine differs from the marine turbine only in the latter is for three separate propeller shafts. The use of the turbine in electric power stations is increasing rapidly; and it is a significant fact that upon Tyneside 85 percent of the power produced is from turbine-driven generators. The total horse power of turbines of the Parsons type delivered and on order at the present time for land purposes is: C. A. Parsons & Co., Heaton Works, 300,000 h. p.; allied works in Great Britain, 120,000 h. p.; allied works on the Continent, 150,000 h. p.; allied works in the United States, upwards of 200,000; in all, 770,000 h. p. Machines under construction include four 500 and four 2,000 k. w. direct current for Marylebone; a 75 k. w. repeat order for the Northern Counties Co.; 750 k. w. repeat order for the Ashington Coal Co.; two 300 k. w. turbo-alternators for Bolckow, Vaughan & Co. There is also at Heaton, being constructed for Guinness, Sons & Co., brewers, a turbine which is to work at an extremely low pressure. This will be driven by exhaust steam, which would be otherwise wasted. It is the first machine of the kind that has left the plant.

Robert E. Jennings, as receiver for the Carpenter Steel Co., of Reading, Pa., has been discharged and allowed $20,000 for his services, after having reorganized the company along lines which enabled him to pay off every obligation of the company in full and return a surplus in excess of the allowance made to him by the court. The company is now in operation and enjoying a prosperous business.

The Star Shovel & Range Co., of Vincennes, Ind., has closed indefinitely and 100 men were thrown out of employment. The company was recently organized and invested $160,000. The shut-down was accredited to low markets.

LAKE SUPERIOR IRON MINES.

Deliveries of new equipment are being made almost daily to the various roads centering at the head of Lake Superior. There are 2,000 50-ton cars to come west, including those for the Great Northern, and 12 engines, and it is probable that many of the cars will be hauled to the ore roads by their own engines. These deliveries will be maintained for some weeks. Nearly all the trains which the Great Northern is now hauling have steel cars, and the average of its train loads must be upwards of 45 tons per car, while the Steel Corporation roads are still using a lot of 25 and 30-ton wood cars, bringing the average loads down to about 35 tons per car. But both are condemning a lot of these cars and the Duluth, Missabe & Northern is to get rid of several hundred of them this spring. The cars have been sold to other roads and the trucks and running gear are delivered, to be used in building new flat cars.

The Great Northern is building about 7 miles of a new double track line making a final connection of its ore road, and giving it practically a complete double track from the docks to collecting yards between the Stevenson and Mahoning mines. There is an immense amount of railway building under way throughout the Mesabi country, and at such towns as Hibbing and Eveleth there are new spurs and sidings, new main lines and branches that are cutting up the region tremendously. Two or three lines of survey have been run for extensions of the Missabe road and Great Northern roads from their termini on the Missabe to the Mississippi river, and roads will be built at once. One line of the Missabe road calls for about 50 miles of new track to handle the traffic of the western end of the range.

Operators unwatering the mines of Stambaugh, Mich., have been troubled greatly of late on account of the immense flow they are encountering. The Verona company is unwatering the Caspian, and it is drowned out for the present, while the Oliver company at the Dober is getting down very slowly. The Caspian struck a big vug or basin and the sudden inrush of water was too much for the pumps. The Dober is lifting 1,800 gallons a minute but needs more pumps to get on.

Corrigan, McKinney & Co. expect to ship about 2,650,000 tons this year from the Lake Superior country, of which about 1,900,000 tons will be from the Mesabi and the rest from the Gogebic and Crystal Falls mines under their control. This is about the same as their last year's business.

At one new property on the western Mesabi range the Oliver Iron Mining Co. is pumping 1,200 gallons a minute, and this from a property whose only opening is a shaft 160 ft. deep, with no lateral workings whatever. This mine is eight miles from the nearest railway point and the fuel is largely coal that must be hauled out by team. Several thousand tons were taken out before and during the spring breakup. At this and other operations in the immediate vicinity about 250 men are at work, for this company and others.

The Gogebic iron ore range will furnish about 100,000 tons Bessemer ore for the steel rail mill at Sault Ste. Marie, Ont., and that amount has been contracted for export to the Sault from the Brotherton, Yale and New Era mines. The Sault will get about 500,000 tons of ore this year, to maintain its mills in operation until the opening of navigation, 1906, while much of the remainder comes from the Negaunee district, and the rest from Mesabi mines, Holland and Forest among the number. Very little of the ore consumed at the Sault will come from Canadian mines.

Mesabi rangemen who have been holding lands in 56-23, on the western Mesabi, have sold to the Rathbone Iron Co. for $30,000, and the latter will explore the property. This is a part of the extensive development now under way on the Western range, and which is thought by many to be one of the most important operations that has been carried on for some time. The U. S. Steel Corporation is employing about 250 men in this part of the range, most of them at the Canisteo, Arcturus and Rohn shafts, but many in exploration outfits in 56-23. The Great Northern road and other parties are also exploring there quite actively.

The Oliver mine, Mesabi range, which has been idle since 1900, is to mine about 350,000 tons this year. Two steam shovels and two locomotives have been taken there and have begun work. About 125 men will be employed during the summer. It is not thought that any additional stripping will be done nor that very much ore will be mined out of the adjoining Ohio, which is also stripped for a large production, but this may be done later in the year. Oliver is said to require almost no cleaning off of the ore body, which has been kept in excellent shape for the past few idle years.

On the Cuyuna range, in northern Minnesota, along the line of the Northern Pacific road near Brainerd, several drills have been set at work lately. The explorations under way by Pickands, Mather & Co. are claimed to be showing satisfactorily, but just what is being found is not given out. The drills working for the Agnew-Alworth syndicate have not made much progress so far as finding an extension of the small ore body known to exist where they went, and before they started. Pickands, Mather & Co. have lands embraced in these descriptions: All in T 45 R 29; section 18, the sw of nw; section 8 the s ½ of sw and sw of se; section 3, s ½ of sw, sw of se; section 10, nw ¼ and ne of ne. The drilling by Agnew et al has been on the se of se section 8-45-29. The original companies have been drilling in the ne of ne section 21-46-28 se of se, ne of se, se of sw section 16, and se of sw section 10, all in T 46-28. Others have been drilling in neighboring locations, notably Wm. Rock, se of ne section 20-46-28. On what is called the north range, and which is an outcrop of the formation near Rabbit lake, the drilling has been on the sw of se section 30-47-28. These are all the operations thus far conducted in the new district.

The Gaffney tract, at Negaunee, has passed into the hands of Pickands, Mather & Co., through the efforts of G. A. St. Clair, who has been operating for them. A full diamond drill exploration has begun with two drills and the land will be plugged full of holes. A contract has been let to Cole & McDonald, of Minnesota, to do this work. If ore is found, it will be mined on a royalty basis. The tract is owned by Mrs. Mary Gaffney, of Negaunee, a pioneer resident of the city and owner of this land for a quarter of a century. It is surrounded by mines and lands upon which iron ore has been found, and consists of 25 acres in the se ¼ of section 6. In this same section is the Breitung Hematite, which was kindly found by the Cleveland Cliffs Iron Co. for the use and benefit of the Breitung estate, and the Blue mine of the Oliver Mining Co. The Prince of Wales mine is east, the Negaunee northeast, the Jackson west and the Lucy south. Drill holes will be put down to a depth considerably beneath the level at which ores have been found in the various surrounding mines.

The T. A. Gillespie Co., general contractor for the erection of the Pittsburg filtration plant, has awarded contracts for the pumping engines, cast iron pipe and the buildings. The Allis-Chalmers Co., Chicago, received the contract for the engines at a price approximating $300,000, and the cast iron pipe, amounting to 1,800 tons, will be furnished by R. D. Wood & Co., Philadelphia. The buildings will be erected by William Kerr's Sons Co. and H. L. Kreusler, Pittsburg, respectively.

Ground has been broken for the construction of a new car machine shop for the Midvale Steel Co., of Philadelphia. The framework will be of steel and the walls of extra heavy brick and stone. The estimated cost of the structure is $225,000.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers :—

The Temple Ornamental & Structural Iron Works, 127 Market street, Camden, N. J., have been incorporated. Capital stock, $100,000. The incorporators are: Alfred J. Genner, Temple, Pa.; Henry Byers, Temple, Pa.; F. L. Richardson, Philadelphia; Wilfred B. Wolcott, Camden, N. J. The company will manufacture and deal in ornamental and structural iron work.

The Benjamin S. Alder Co., New York City, has been incorporated to manufacture hardware, cutlery, etc. Capital stock, $20,000. The incorporators are: Benjamin S. Alder, 1162 Pacific street, Brooklyn, N. Y.; William W. Crowell, James Tongue, 37 Warren street, New York.

The Cincinnati Galvanizing Co., Cincinnati, O., has been incorporated with a capital of $20,000. Incorporators: Christian Schott, J. M. Schott, J. R. Schott Jr., Louis Schott, George M. Schott and William C. Schott.

The Metal Screen & Mfg. Co., of St. Paul, Minn., has been incorporated by M. D. Flower, George J. Grant, F. A. Eldredge, J. D. Roberts, W. T. Rich, John Copeland, Leonard Breher, C. E. Hamilton, E. A. Mierke, C. J. Whellams, H. B. Carroll. The capital is $50,000

The Edward H. Munkwitz Co., Wilwaukee, Wis., has been incorporated with a capital of $50,000 to manufacture and sell machinery. The incorporators are: Edward H. Munkwitz, Arthur R. Munkwitz and Herman Fehr.

The Advance Machinery Co., Toledo, O., has been incorporated with a capital stock of $80,000 by J. A. Taggart, E. B. Smith, H. W. Platt, Clarence F. Smith and Frank H. Greer. This is merely a change from a Washington, D. C., incorporation to an Ohio incorporation. E. B. Smith and C. F. Smith are new stockholders.

The Standard Machinery Co., Norwalk, O., has been incorporated by Wm. H. Wilson, O. M. Brown, Y. M. Brown, P. Wilson and M. C. Brown. The capital stock is $50,000

The Duplex Stamping Co, Vermillion, O., has been incorporated with a capital stock of $250,000. The incorporators are: J. L. Zesiger, Caroline Zesiger, Geo. Smith, Belle Smith and E. L. Caen.

The Columbia Iron & Wire Co., Canton, O., has been incorporated. The incorporators are: J. E. Roben, C. E. Whippy, George W. Greene, Jacob L. Piper and Chas. H. Lind. The capital stock is $50,000.

The Bauer Machine Co, Jeffersonville, Ind., has been incorporated with a capital stock of $15,000. The directors are: Geo. B. Holzong, Charles V. Bauer and Henry M. Flexner.

The Crest Valve Mfg. Co., New York City, has been incorporated to manufacture metals, valves, etc.; capital, $50,000. The incorporators are: William G. Green, William H. Bond, Brooklyn; Forbes J. Holland, New York City.

Fuhrman Hardware & Plumbing Co., Elmira, N. Y., has been incorporated to manufacture hardware and hardware supplies. The capital stock is $25,000. The incorporators are: Harry K. Fuhrman, Burton Martin, W. W. Hervey, John C. Dyatt and Chas. S. Gary, all of Elmira.

Major Townsend, engineer of Manila harbor, has been authorized to advertise for bids for the construction of two concrete and steel wharves, one 70 x 600 ft. and the other 110 x 650 ft. The commission will reserve for the purpose $550,000 from the proceeds of the next issue of improvement bonds, in accordance with the act of Congress of Feb. 6.

The Phœnix Tube Co., of Brooklyn, has been incorporated at Albany, N. Y., with a capital stock of $100,000. The directors are: F. S. Male, E. C. Midgely, and Moses Ely.

The Hawkeye Mfg. Co., for the manufacture of gas engines has been incorporated in Iowa and will locate a factory at Waterloo. The officers are: D. S. Merriman, president; A. G. Merriman, vice president; A. L. Cihak, secretary; M. L. Marquis, treasurer; R. L. Scribner, J. F. Hill and J. N. Hill, board of directors.

The Steel Products Co., Chicago, Ill., has been incorporated to manufacture cutlery. The incorporators are: Albert N. Eastman, Edward P. Eastman and Don E. Harris; capital stock, $2,500.

The Atlantic Mfg. Co., Savannah, Ga., has applied for a charter of incorporation, with privileges of manufacturing and selling iron piping. The capital stock of the company is given at $8,000. The incorporators are: Stephen H. Collins, Malcolm D. Neill, Charles W. King, Fred B. King and W. S. Collins.

The Interstate Boiler Works, Sioux City, Ia., have filed articles of incorporation. The company is capitalized at $5,000, and will engage in the manufacture of boilers. The officers are: William H. Gillis, president; Nellue M. Murphy, vice president and W. H. Murphy secretary and treasurer.

The Lusk Foundry Co., Ltd., Grand Rapids, Mich., has been incorporated for the purpose of carrying on a general foundry and machine shop business. The company has an authorized capital stock of $10,000, of which $5,450 has been subscribed and $4,700 paid in in cash and $750 in property.

The Capital Castings Co., Lansing, Mich., has been incorporated for the purpose of manufacturing castings and doing a general foundry business. The authorized capital stock of the company is $15,000, of which $8,350 has been subscribed.

The Annable-Fitzgerald Engineering & Mfg. Co., Grand Rapids, Mich., has been incorporated to carry on a general engineering business. The capitalization has been placed at $10,000, of which $5,000 has been subscribed. Warren J. Annable and J. Watson Fitzgerald each own one-half the stock.

The Virginia Ore & Iron Co., Baltimore, Md., has been incorporated to engage in the mining or manufacture of iron ore, coal and other minerals and the production of mining machinery. The capital stock is $250,000.

The R. Watt Machine Works, Ridgetown, Canada, have been incorporated with a capital stock of $50,000. The company will conduct a foundry and machine, boiler and agricultural implement shop.

The Casey & Hodges Mfg. Co., Chattanooga, Tenn., has been incorporated with a capital stock of $300,000. The incorporators are: P. J. Casey, W. G. Thomas, J. B. Sizer, S. Bartow Strang and Battle McLester. The company is engaged in the manufacture of boilers.

The Tennessee Mill Supply Co., Knoxville, Tenn., has been incorporated. The new company is located at 204 Commerce avenue, and will handle mill, mining and machinery supplies. The officers are: Geo. H. Manning, president; Henry F. Manning, vice president, and J. H. Henderson, secretary and treasurer.

The Smith Stacker & Feeder Co., Hamilton, Ontario, has been incorporated with a capital of $40,000. The company will manufacture agricultural implements and carry on a general foundry business

The capital of the Guelph Spring & Axle Co., Guelph, Ont., has been increased to $100,000. The company has been authorized to issue 800 additional shares of stock at $100 each.

Bridge Commissioner Best, of New York City, within a few weeks will advertise for bids for a large supply of steel for the municipality. The steel is wanted for the superstructure of the new Manhattan bridge and specifications call for 18,000 tons.

T. W. Demarest, superintendent of motive power for the Northwest system, is in the market for a vast amount of tools and machinery for the shops at Fort Wayne, Chicago, Allegheny, Wellsville, Cleveland, Erie, Mahoningtown, Ashtabula, Columbus, Alliance and Crestline.

Fires :—

Fire in the works of the Household Sewing Machine Co., at Providence, R. I., on May 1 caused $100,000 damage.

The machine shop and boiler house of the Burns & Russell Co., brick manufacturers at Dundalk, Baltimore county, Md., were destroyed by fire April 28. Both were fully insured.

The plant of the Springfield Boiler & Mfg. Co., Springfield, Ill., was destroyed by fire May 3, throwing 150 men out of employment. The loss amounts to $100,000, with $60,000 insurance. The works will be rebuilt at once.

Fire in the warehouse and salesroom of the Illinois Malleable Iron Co., Chicago, May 3, caused a loss of $10,000.

Fire visited the plant of the Fagan Iron Works, Jersey City, N. J., last week, destroying the foundry, a two-story engine and boiler room and a four-story pattern shop. The older portion of the plant was saved, but a large number of valuable patterns and considerable machinery were destroyed. The estimated loss is $10,000.

New Construction :—

Harry G. Siebens and Martin Meinen are preparing to erect a machine shop at Pekin, Ill.

The Wood Bros.' Steel Self Feeder Co., of Des Moines, Ia., is about to construct a substantial addition to its plant.

The Lakeside Malleable Casting Co., of Racine Wis., has contracted for the construction of a new casting shop, 350 x 100, one story high with a cupola.

Nailon Bros., of Peoria, Ill., have taken out a permit for the construction of a new warehouse and machine shop.

F. E. Meyers & Co., of Ashland, O., are building a large addition to their plant, in the shape of a new foundry building.

The old furnace of the Alabama Consolidated Co., at Gadsden, Ala., is being torn down to make room for the new furnace to be built by the company.

The Mansfield Lumber Co., of Mansfield, O., has completed the concrete foundation for the new machinery building it is constructing. A new carpenter shop will replace the one recently destroyed by fire.

Steel work has been started on the construction of the new Wabash freight depot, adjoining the passenger station, at Pittsburg.

The Knoxville Traction Co., Knoxville, Tenn., has let the contract for the construction of new car barns and repair shops. Both buildings are to be fireproof structures.

The Louisville & Nashville railroad will start this week on the construction, at West Knoxville, Tenn., of a large plant for repairs to cars on the Knoxville division. The plant will be operated in connection with the roundhouse shops at Riverside.

The machinery is now being placed in the new shops of the Paris Interurban Car Works, Paris, Ill. Indications are that the whole plant will be in operation in about six weeks.

The Atlas Wire Co., of Peoria, Ill., has decided to put in a rod mill at Bartonville, Ill. A new steel building will be erected.

The Washburn-Crosby Co., of Minneapolis, Minn., will build a $40,000 machine shop to care for its flour mill equipment. All machinery will be electrically operated.

The Urie Boiler & Mfg. Co., of Kansas City, Mo., will build a new plant to increase the capacity of its plant for the manufacture of boilers and machinery.

The Hoover Stove & Casting Co., and the Hoover Plow & Mfg. Co., Kansas City, Mo., have broken ground for the construction of two new plants.

General Industrial Notes:—

The Fitchburg Machine Works, of Fitchburg, Mass., has been sold by the estates holding the control of it to an association headed by Marcus A. Coolridge, who will shortly organize a company, of which he will be president. The company was established in 1867.

The McInnes Steel Co., of Corry, Pa., recently closed a contract with the Union Pacific railroad for $90,000 worth of tool steel.

F. B. McCroskey & Co., manufacturers of reamers at Meadville, Pa., who recently went into a receivership, report a prosperous business and indications are they will be able to settle in full with their creditors.

The Colburn Machine Tool Co., of Franklin, Pa., has found it necessary to put on a night force in order to fill contracts already booked.

The American Engineering Co., with offices at 612 Traction Terminal building, Indianapolis, Ind., has been recently organized and is in the field as designer and builder of steam and electric railroads, elevators, mills, bridges, factory plants, etc.

The Buckeye Foundry Co., of Cincinnati, is to be dissolved as a corporation and formed into a co-partnership by Wm. Gilbert and Chas. Lang. The corporation dissolves May 26 and thereafter will be conducted under the name Buckeye Foundry.

The Heron Pump & Foundry Co., of Chattanooga, Tenn., has secured a contract to furnish the borough of Brooklyn, N. Y., 1,000 fireplugs. The company will also furnish some material for the Panama canal.

Smith & Caffrey, of Syracuse, N. Y., announce they have taken over the business of C. H. Green & Co., and will manufacture the Eureka snap flask.

Wickwire Bros., of Cortland, N. Y., manufacturers of woven wire goods and nails, have orders booked ahead to keep them busy two months.

The Canadian Parliament at Ottawa has extended for five years the time for constructing the bridge and terminal facilities of the Montreal Bridge Co., which has changed its name to Montreal Bridge & Terminal Co.

Wayne township, Noble county, O., in which Kendallville is located, on June 12 will vote on a proposition to donate a subsidy of $20,000 for the location of the power house and machine shops of the proposed Toledo & Chicago interurban line. line.

The Richmond Iron Works have succeeded the Richmond Iron Co., at Richmond Furnace, Mass. The old company goes out of existence.

The Minnesota Mining & Mfg. Co. has secured from McCarthy Bros. & Co. a ten-year lease on the old Imperial mill property with an option to buy the plant. This concern owns the corundum properties on the north shore of Lake Superior, at Crystal Bay, 69 miles from Duluth. The plant will become one of the leading industries at the head of the lakes in the manufacture of sandpaper, emery wheels and kindred products.

Chas. B. Jacobs announces the opening of a chemical and electro-chemical laboratory at 52 Beaver street, New York, and will carry on a general consulting and industrial research business. Mr. Jacobs was connected for several years with the General Electric Co. in charge of the chemical laboratory at Schenectady and for the past seven years has been engaged in experimental and development work, for part of that time in connection with electro-chemical operations at Niagara Falls.

The Toledo-Massillon Bridge Co., Toledo, O., has elected the following officers: President, T. H. Tracy; vice president, J. J. Swigert; secretary and treasurer, C. P. Peckham; chief engineer, C. S. Davis. This company recently purchased the Massillon Bridge Co., Massillon, which was taken over on May 1. It is the intention to build a plant at Toledo, and several sites on the Terminal are now under consideration. The company is capitalized at $250,000, half of which is paid in, the remainder to be paid when the company builds its plant.

The Pettijohn Co., recently incorporated at Terre Haute, Ind., as successors to Pettijohn Bros., and allied with the Terre Haute Pressed Brick Co. has purchased a building in which it will manufacture concrete brick machines. New machinery will be installed.

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Accumulators—
Alliance Machine Co., Alliance, O.
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
The Cleveland Machine & Mfg. Co., Cleveland, O.
Mesta Machine Co., Pittsburg, Pa.
Morgan Construction Co., Worcester, Mass.
Niles-Bement-Pond Co., New York.
United Engineering & Fdy. Co., Pittsburg, Pa.
Watson-Stillman Co., New York City.
R. D. Wood & Co., Philadelphia, Pa.

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American Air Compressor Works, N. Y. City.
American Well Works, Aurora, Ill.
A. S. Cameron Steam Pump Works, New York City.
Curtis & Co. Mfg. Co., St. Louis, Mo.
General Pneumatic Tool Co., Montour Falls, N. Y.
Great Lakes Engineering Works, Detroit, Mich.
Ingersoll-Sergeant Drill Co., New York City.
Laidlaw-Dunn-Gordon Co., New York City.
Rand Drill Co., New York City.

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Geo. G. Blackwell Sons & Co., Liverpool, Eng.

Annealing Boxes—
Girard Boiler & Mfg. Co., Girard, O.
Meehan Boiler & Cons. Co., Lowellville, O.
J. W. Paxson Co., Philadelphia, Pa.

Anti-Friction Metal—
Phosphor-Bronze Smelting Co., Philadelphia, Pa.

Arbor Presses—
Edwin E. Bartlett, Boston, Mass.

Ball Bearings—
Auburn Ball Bearing Co., Rochester, N. Y.

Band Saw Filing Devices—
New Britain Machine Co., New Britain, Conn.
Long & Allstatter Co., Hamilton, O.

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Beals & Co., Buffalo, N. Y.
Bourne-Fuller Co., Cleveland, O.
Forest City Steel & Iron Co., Cleveland, O.
Fort Wayne Iron & Steel Co., Ft. Wayne, Ind.
Globe Rolling Mills Co., Cincinnati, O.
Harrow Spring Co., Kalamazoo, Mich.
Arthur C. Harvey & Son, Boston, Mass.
Republic Iron & Steel Co., Chicago, Ill.
Joseph T. Ryerson & Son, Chicago, New York and Pittsburg.
Sligo Iron & Steel Co., Pittsburg, Pa.
W. H. Thompson & Co., Philadelphia, Pa.
Wm. B. Walter & Co., Chicago, Ill.

Bellows and Blowers—
Hill & Griffith Co., Cincinnati, O.
The S. Obermayer Co., Cincinnati and Chicago.
J. W. Paxson Co., Philadelphia, Pa.
The J. D. Smith Fdy. Supply Co., Cleveland.
Green Fuel Economizer Co., Matteawan, N. Y.

Belt Dressing—
The Ironsides Co., Columbus, O.
Jos. Dixon Crucible Co., Jersey City, N. J.
Shultz Belting Co., St. Louis, Mo.

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Chicago Rawhide Mfg. Co., Chicago, Ill.
Gandy Belting Co., Baltimore, Md.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Machinery Co., Chicago, Ill.
Shultz Belting Co., St. Louis, Mo.
The Whitman & Barnes Mfg. Co., Chicago, Ill.

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Bertsch & Co., Cambridge City, Ind.
E. W. Bliss Co., Brooklyn, N. Y.
Chambersburg Engineering Co., Chambersburg Pa.
Cleveland Punch & Shear Works Co., Cleveland, O.
Espen-Lucas Machine Works, Philadelphia, Pa.
National Machinery Co., Tiffin, O.
Niles-Bement-Pond, Co., New York.
Watson-Stillman Co., New York City.
Williams, White & Co., Moline, Ill.
R. D. Wood & Co., Philadelphia, Pa.

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Amsler Engineering Co., Pittsburg, Pa.
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The Macbeth Iron Co., Cleveland, O.
Meehan Boiler & Construc. Co., Lowellville, O.
Pittsburg Valve, Foundry & Construction Co., Pittsburg, Pa.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Russel Wheel & Foundry Co., Detroit, Mich.
Southwark Fdy. & Mach. Co., Philadelphia, Pa.
The Wellman-Seaver-Morgan Co., Cleveland, O.

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The W. P. Davis Mach. Co., Rochester, N. Y.
Dravo, Doyle & Co., Pittsubrg, Pa.
The Girard Boiler & Mfg. Co., Girard, O.
Harrison Safety Boiler Works, Philadelphia.
The Hooven, Owens, Rentschler Co Hamilton, O.
Hyde Bros. & Co., Pittsburg, Pa.
E. Keeler Co., Williamsport, Pa.
The Meehan Boiler & Construction Co., Lowellville, O.
Riter-Conley Mfg. Co., Pittsburg, Pa.
W. W. Shilling, Sharon, Pa.
Struthers-Wells Co., Warren, Pa.
Vilter Mfg. Co., Milwaukee, Wis.

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Baird Machinery Co., Pittsburg, Pa.
National Machinery Co., Tiffin, O.
Standard Engineering Co., Elwood City, Pa.
Williams Tool Co., Erie, Pa.

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American Iron & Steel Mfg. Co., Lebanon, Pa.
Garland Nut & Rivet Co., Pittsburg, Pa.
Graham Nut Co., Pittsburg, Pa.
A. G. Hathaway & Co., Cleveland, O.
Milton Manufacturing Co., Milton, Pa.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Joseph T. Ryerson & Son, Chicago, New York and Pittsburg.
Upson Nut Co., Cleveland, O.

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Niles-Bement-Pond Co., New York.
Pawling & Harnischfeger, Milwaukee, Wis.
Pratt & Whitney Co., Hartford, Conn.
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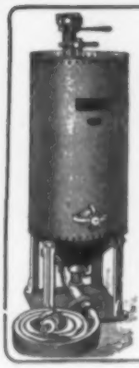

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Niles-Bement-Pond Co., New York.
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Pittsburg Construction Co., Pittsburg, Pa.
Riter-Conley Mfg. Co., Pittsburg, Pa.
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Buffalo Foundry Co., Buffalo, N. Y.
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Francis & Nygren Fdy. Co., Chicago, Ill.
Great Lakes Engineering Wks., Detroit, Mich.
Lake Erie Engineering Works, Buffalo, N. Y.
The Macbeth Iron Co., Cleveland, O.
Mesta Machine Co., Pittsburg, Pa.
New Jersey Fdy. & Mach. Co., New York City.
Nortmann-Duffke Fdy. Co., Milwaukee, Wis.
Russel Wheel & Fdy. Co., Detroit, Mich.
Taylor, Wilson & Co., Ltd., Allegheny, Pa.
The Wm. Tod Co., Youngstown, O.
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United Engineering & Fdy. Co., Pittsburg, Pa.
United States Cast Iron Pipe & Fdy. Co., New York.
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The Haven Malleable Casting Co., Cincinnati, O.
Meadville Malleable Iron Co., Meadville, Pa.
Missouri Malleable Iron Co., East St. Louis, Ill.
New Jersey Fdy. & Mach. Co., New York City.
Pratt & Letchworth Co., Buffalo, N. Y.
Wm. B. Walter & Co., Chicago, Ill.

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National Steel Foundry Co., New York.
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Link-Belt Machine Co., Chicago, Ill.
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Interstate Engineering Co., Cleveland, O.
Lemley & Schultz, Chicago, Ill.
Link-Belt Machinery Co., Chicago, Ill.
Chas. G. Smith Co., Pittsburg, Pa.

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Interstate Engineering Co., Cleveland, O.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Machinery Co., Chicago, Ill.
McLanahan-Stone Mach. Co., Hollidaysburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
R. S. Newbold & Son Co., Norristown, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.
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Riter-Conley Mfg. Co., Pittsburg, Pa.
Russel Wheel & Fdy. Co., Detroit, Mich.
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Espen-Lucas Machine Wks., Philadelphia, Pa.
Hurlburt-Rogers Machine Co., South Sudbury, Mass.
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Interstate Engineering Co., Cleveland, O.
New Britain Machine Co., New Britain, Conn.
Pratt & Whitney Co., Hartford, Conn.

Direct Motor Drive for Planers—
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The W. P. Davis Mach. Co., Rochester, N. Y.
The William E. Gang Co., Cincinnati, O.
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Chas. G. Smith Co., Pittsburg, Pa.
Vandyck Churchill Co., New York City.

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Bickford Drill & Tool Co., Cincinnati, O.
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Cincinnati Machine Tool Co., Cincinnati, O.
Cleveland Punch & Shear Wks. Co., Cleveland.
Knecht Bros. Co., Cincinnati, O.
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Niles-Bement-Pond Co., New York.
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Meehan Boiler & Cons. Co., Lowellville, O.
Morgan Construction Co., Worcester, Mass.
New Jersey Foundry & Machine Co., New York City.
Pittsburg Construction Co., Pittsburg, Pa.
Pittsburg Valve, Foundry & Construction Co., Pittsburg, Pa.
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Riter-Conley Mfg. Co., Pittsburg, Pa.
Russel Wheel & Foundry Co., Detroit, Mich.
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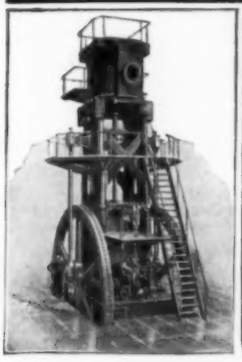

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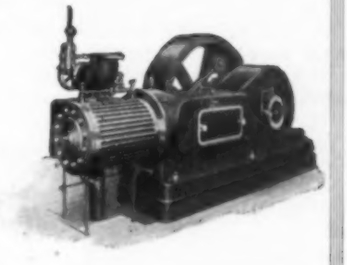

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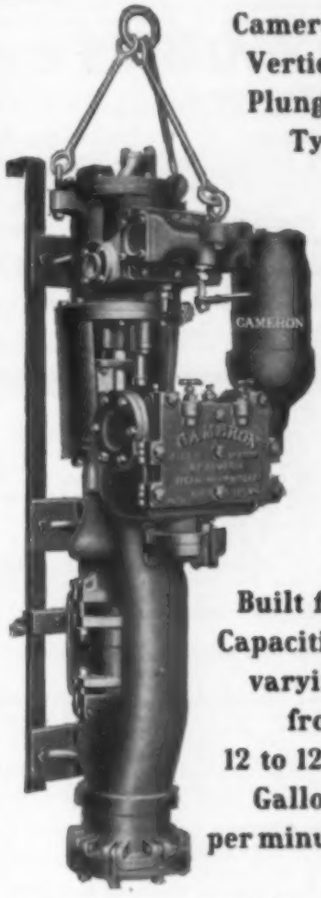

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Lidgerwood Mfg. Co., New York City.
The Macbeth Iron Co., Cleveland, O.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
New Britain Machine Co., New Britain, Conn.
Northern Engineering Works, Detroit, Mich.
The Ruger Mfg. Co., Buffalo, N. Y.
Southwark Fdy. & Mach. Co., Philadelphia.
Struthers-Wells Co., Warren, Pa.
The Wm. Tod Co., Youngstown, O.
Vilter Mfg. Co., Milwaukee, Wis.
The Welman-Seaver-Morgan Co., Cleveland, Ohio.
Wickes Bros., Pittsburg, Pa.

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The S. Obermayer Co., Cincinnati and Chicago.
J. W. Paxson Co., Philadelphia, Pa.
The J. D. Smith Fdy. Supply Co., Cleveland.
P. B. Stevens, Detroit, Mich.

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Dover Fire Brick Co., Cleveland, O.
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Kier Fire Brick Co., Pittsburg, Pa.
Laclede Fire Brick Co., St. Louis, Mo.
E. S. McLain & Son, Pittsburg, Pa.
Niles Fire Brick Co., Niles, O.
Oak Hill Fire Brick & Coal Co., Oak Hill, O.
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Hiram Swank's Sons, Johnstown, Pa.

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Riter-Conley Mfg. Co. Pittsburg, Pa.

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Flexible Shafts—
Stow Mfg. Co., Binghamton, N. Y.

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E. W. Bliss Co., Brooklyn, N. Y.
Long & Allstatter Co., Hamilton, O.
National Machinery Co., Tiffin, O.
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Williams, White & Co., Moline, Ill.

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E. D. Clapp Mfg. Co., Auburn, N. Y.
Cleveland City Forge & Iron Co., Cleveland, O.
The Cleveland Machine & Mfg. Co., Cleveland, O.
Jos. Dyson & Son, Cleveland, O.
Great Lakes Engineering Wks., Detroit, Mich.
A. G. Hathaway & Co., Cleveland, O.
Heppenstall Forge & Knife Co., Pittsburg, Pa.
Tindel-Morris Co., Eddystone, Pa.
The Toledo Machine & Tool Co., Toledo, O.
Transue & Williams, Alliance, O.
The Whitman & Barnes Mfg. Co., Chicago, Ill.
Union Drop Forge Co., Chicago, Ill.
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Wyman & Gordon, Cleveland, O.

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Burns Hydro Carbon Burner Co., Fort Plain.
Tate, Jones & Co., Pittsburg, Pa.
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The United Coke & Gas Co., New York.
The Wellman-Seaver-Morgan Co., Cleveland, O.
R. D. Wood & Co., Philadelphia, Pa.

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H. W. Caldwell & Son Co., Chicago, Ill.
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Farrel Fdy. & Machine Co., Ansonia, Conn.
Fawcus Machine Co., Pittsburg, Pa.
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The Van Dorn & Dutton Co., Cleveland, O.

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Macbeth Iron Co., Cleveland, O.
New Jersey Fdy. & Mach. Co., New York City.
Niles-Bement-Pond Co., New York.
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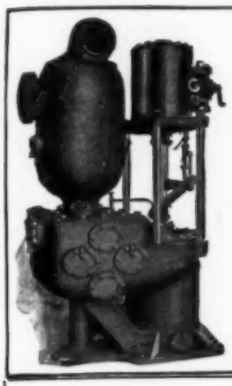

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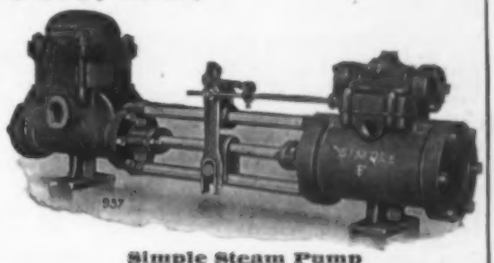

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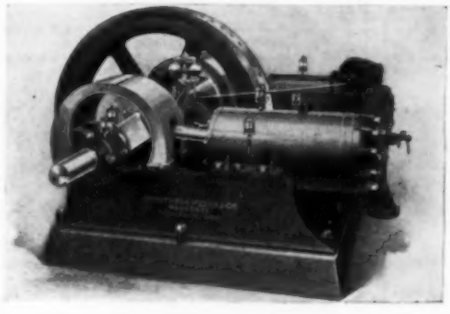

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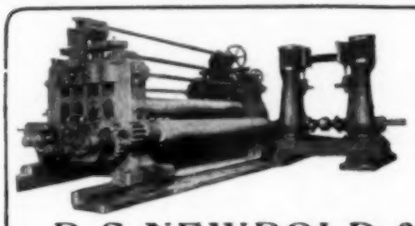

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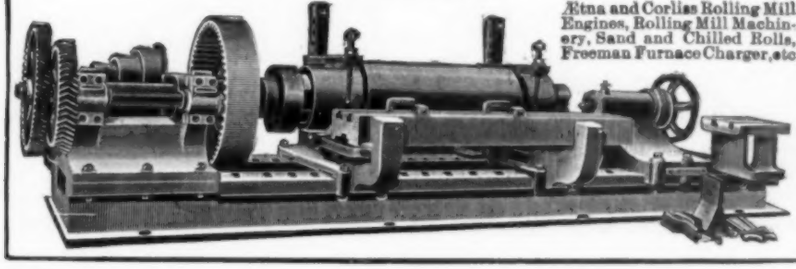

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"Can't afford to buy a rifle," he said—
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He found the bear.

The tomb stone cost his friends more than the rifle would have cost him.

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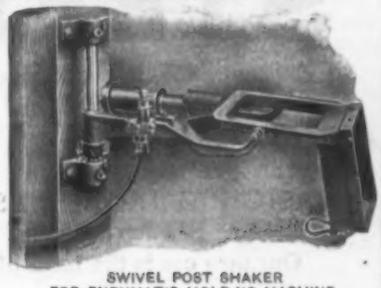

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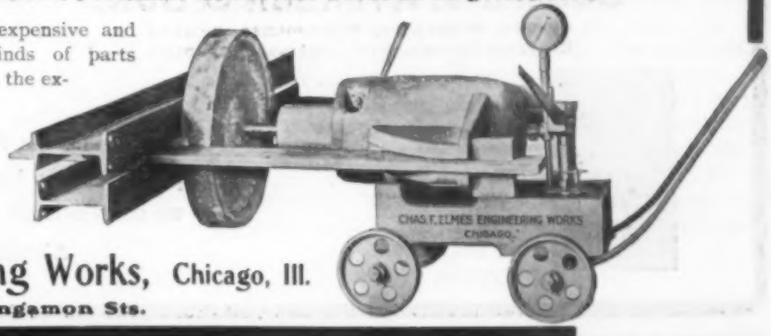

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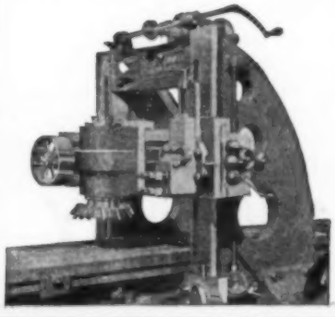

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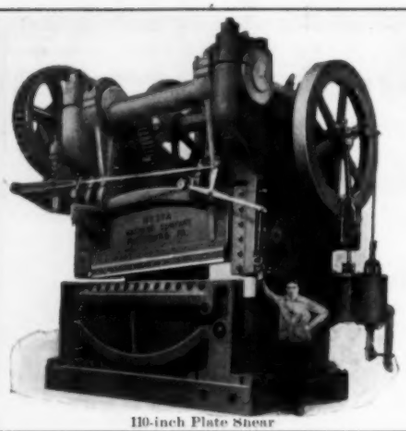

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